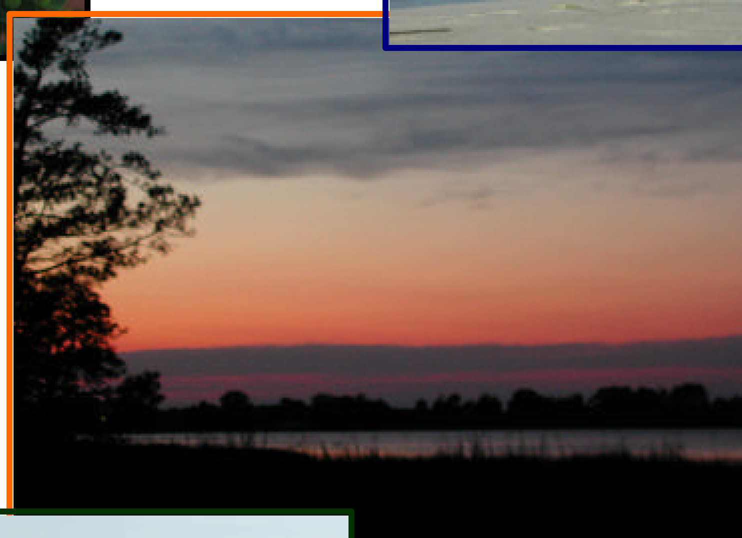
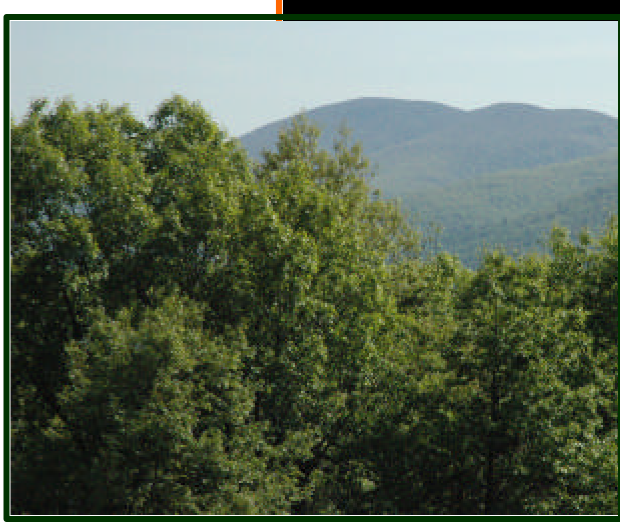
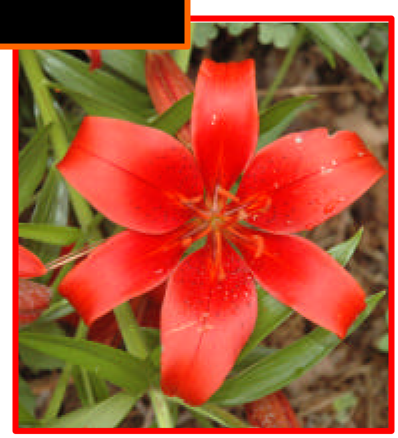
Virginia Ambient Air Monitoring 2005 Data Report



Department of Environmental Quality

Commonwealth of Virginia
Department of Environmental Quality

VIRGINIA DEPARTMENT OF
ENVIRONMENTAL QUALITY

Office of Air Quality Monitoring
4949-C Cox Road
Glen Allen, VA 23060

This Ambient Air Monitoring Data Report is for the time period of January 1, 2005 to December 31, 2005.

On The Cover

Pictures taken by Crystal, Tim and Megan Sorensen

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Director, Division of Air Quality

Acknowledgements:

Thanks to Delaware and West Virginia for their inspirational Air Quality Reports. Their composition was instrumental in the creation of this report. We would also like to thank James Dinh, Tom Jennings, Carolyn Stevens, Dan Salkovitz, Baxter Gilley and Charles (Brian) King.

Published, October 2006

2005 Annual Report prepared by:
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Dear Annual Report User:

A limited number of printed copies will be available for 2006. The report will be available on the internet at http://www.deq.virginia.gov/airmon/publications.html. If you would like to receive a printed copy, please fill out the information below, and either fax or mail to the following:

Department of Environmental Quality
Office of Air Quality Monitoring
Attn: Crystal Sorensen
4949-C Cox Road
Glen Allen, VA 23060

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Date ____________________

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____ Company

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GENERAL INFORMATION:

We are responsible for seeing that the Virginia ambient air monitoring network is maintained and operated in accordance with State and Federal guidelines. Personnel from DEQ regional offices, the City of Alexandria, Fairfax County Health Department, the National Park Service, and the Department of Agriculture Forest Service conduct the daily operations at these sites. One of our primary jobs is to support these people in their monitoring efforts. This is done by:

- calibrating air monitoring instrumentation and associated support equipment on a set schedule
- auditing the instrumentation to insure that it is operating within set standards
- troubleshooting instrumentation problems reported by the operators
- supplying field operators with necessary items so they can perform their job properly
- repairing malfuctioning sampling instrumentation and ancillary equipment

Office of Air Quality Monitoring

Other functions:

- respond to regional and locality requests for special sampling such as emergency response or to answer citizen complaints
- coordinate efforts with the regional offices and localities to determine new air monitoring site locations
- conduct AQM generated special sampling projects to characterize a community's air
- furnish ambient air data to the regional offices, localities, Central Office, EPA and the EPA database
- answer FOIA requests for ambient air sampling data
- work with the regions and the localities to see that area monitoring needs are met
- work with EPA to see that necessary State and Federal monitoring needs are met
- support VISTAS and MARAMA on routine and special projects

Criteria Pollutant Monitoring:

A portion of the air monitoring network is made up of instruments that sample for the Criteria Pollutants. Sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone and particulate matter (PM10 & PM2.5) can injure health, harm the environment and cause property damage. EPA calls these pollutants criteria air pollutants because they have regulated them by first developing health-based criteria (science-based guidelines) as the basis for setting permissible limits. One set of limits (primary standard) protects health; another set of limits (secondary standard) is intended to prevent environmental and property damage

Special Monitoring:

In addition to overseeing the air sampling network for criteria pollutants, AQM conducts routine and short term sampling for VOCs (volatile organic compounds), Carbonyls, Toxic Metals and NOy (total reactive nitrogen). Sampled VOCs are made up of 41 HAPs (Hazardous Air Pollutants) and 55 Hydrocarbon Ozone Precursors.

1. **What is the Clean Air Act?**

The Clean Air Act is a federal law that provides for the protection of human health and the environment. The original Clean Air Act was passed in 1963, and the 1970 version of the law resulted in the creation of the U.S. Environmental Protection Agency (EPA), which was charged with setting and enforcing ambient air quality standards. The law was amended in 1977, and most recently in 1990. Most of the activities of the Virginia Department of Environmental Quality's Air Division come from mandates of the Clean Air Act, and are overseen by the EPA. More information on the 1990 amendments to the Clean Air Act can be found at: http://www.epa.gov/air/oaq_caa.html.

2. **What is a criteria air pollutant?**

The Clean Air Act names six air pollutants that are commonly found in the air throughout the United States, and that can injure humans by causing respiratory and cardiovascular problems, and harm the environment by impairing visibility, and causing damage to animals, crops, vegetation and buildings. EPA has developed health-based criteria for these pollutants through scientific studies, and has established regulations setting permissible levels of these pollutants in the air. The "criteria" pollutants are: carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, particulate matter, and lead, and the limits that have been set for them are the National Ambient Air Quality Standards (NAAQS).

3. **What is the difference between a primary and secondary National ambient Air Quality Standard?**

The National Ambient Air Quality Standards are divided into two types. The first type, the primary standard, is designed to protect human health, especially those who are most vulnerable such as children and the elderly, and people suffering from asthma, emphysema, and chronic bronchitis, and heart ailments. The second type, the secondary standard, is designed to prevent damage to property and the environment. For a list of the primary and secondary National Ambient Air Quality Standards, see http://www.epa.gov/air/criteria.html or page 67 of this report.

4. **How is the location of an air monitoring station decided?**

Generally the deciding factor in all Virginia air monitoring sampling is to determine where the highest pollutant concentrations will occur, and place the sampler as near as possible to that location. A wind rose is typically used to determine the prevailing wind direction for an area and identify the downwind direction from a probable source.

For typical criteria pollutant monitoring, the federal guidelines on siting an air monitor for maximum concentrations sampling are followed. These guidelines not only suggest that areas with free airflow and a minimum amount of obstructions be found, but also will give the height requirements for the sample inlet and give the desired separation distances from obstructions such as tree lines, localized sources such as oil furnace flues, and other influences that can skew the data.

Other determining factors for placing air monitoring stations include:

- security of the site
- safety of the operator
- availability of electric power and communication service
- accessibility of the site

For more specific information, consult EPA's Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Part1, Section 6, http://www.epa.gov/ttnamti1/redbook1.pdf

5. How large of an area does an air monitoring station represent?

The sampling area of a monitoring site is dependent on the parameters selected for representation, such as:

- type of pollutants being sampled
- rural vs. urban sampling
- source oriented, population oriented, or background oriented
- is the sampling for pollution transported from outside the Commonwealth?

Many sites are also dependant on topography and meteorology of an area, and play an important role. Federal guidelines spell out the general area of representation. Some examples of varied air sampling sites are:

- A background research site in central Virginia may represent an area with a radius of 50 to 100 kilometers.
- An ozone or fine particulate site in the Shenandoah Valley may represent an elongated area with an axis running with the valley and is a hundred kilometers long but only twenty-five kilometers wide.
- A carbon monoxide sampling site in an urban street canyon setting may represent an area only a couple city blocks in radius.
- A source oriented site in south central Virginia may represent an area from 0.5 to 4 kilometers in radius.

For more specific information, consult EPA's Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Part1, Section 6, http://www.epa.gov/ttnamti1/redbook1.pdf

6. What is a "nonattainment" area?

A nonattainment area is a geographic area that has been determined by EPA as not meeting the air quality standards for one or more pollutants. Typically, an area is declared nonattainment based on data collected at one or more ambient air monitoring sites within the area. However, sometimes the nonattainment designation can be made based on the use of air quality models that use monitoring data from other areas. In Virginia, nonattainment areas are designated for two of the criteria pollutants, ozone and fine particulate matter ($PM_{2.5}$).

7. How can I find out if I live in a nonattainment area?

A list of nonattainment areas in Virginia can be found in this report on page 69. On the web, the ozone nonattainment areas can be found at
http://www.deq.state.va.us/air/status.html
and the $PM_{2.5}$ nonattainment areas can be found at http://www.deq.state.va.us/air/status2.html
Also, EPA has a comprehensive list of all nonattainment areas in the country at http://www.epa.gov/air/oaqps/greenbk/.

8. **What are the impacts of nonattainment designation?**

To demonstrate how they plan to achieve federal air quality standards, states must draft a "State Implementation Plan," or SIP. This plan lists specific actions that the state will undertake to improve and maintain acceptable air quality, and a time frame for accomplishing these goals. The SIP may require new factories to install the newest and most effective air pollution control technologies. Other actions could be requiring older factories to retrofit their smokestacks with better pollution control devices, requiring an area to sell only reformulated gasoline during the summer months, requiring vapor recovery systems on gasoline pumps, and requiring vehicle exhaust emission checks, to name a few. SIP development is a lengthy process, and involves negotiation between the state and the EPA until it is finalized.

9. **What is an Early Action Compact (EAC) area?**

In April 2004, EPA published a final rule listing areas in the country designated as not attaining the 8-hour ozone ambient air quality standard. A few areas, including two in Virginia, Roanoke and Frederick County/Winchester, entered into Early Action Compacts (EAC) with EPA before the nonattainment designations were published, because they were facing the possibility of being designated nonattainment for ozone. The compacts allowed the participating areas to come up with their own plan for meeting the 8-hour ozone standard, provided they meet certain milestones and they attain the 8-hour ozone standard no later than December 31, 2007. As part of the EAC, EPA agreed to defer the nonattainment designation. If the EAC areas fail to meet the ozone standard by the December 31, 2007 deadline, they will be designated as ozone nonattainment areas.

10. **How can I get current or historical air quality data?**

Current ozone data for Virginia, as well as current AQI and air quality forecasts can be obtained at www.deq.virginia.gov/airquality. Summary air quality data for ozone and PM2.5 can be found on the DEQ website at www.deq.virginia.gov/airquality and www.deq.virginia.gov/airmon/pm25home.html.
Annual monitoring data reports for DEQ from 2001 to the present can be found at http://www.deq.virginia.gov/airmon/publications.html. EPA provides monitoring and emissions data, as well as maps, on the web at http://www.epa.gov/air/data/index.html. Detailed data for monitoring sites in Virginia can also be obtained by contacting the VA DEQ Office of Air Quality Monitoring.

11. **What do I do if I have a complaint about air quality in my neighborhood?**

Contact the DEQ regional office in your area. To see a list of regional offices and phone numbers, see page 58 of this report, or visit www.deq.virginia.gov/prep.

12. **Who can I call about an indoor air quality problem, such as mold or radon gas?**

Your local health department may be able to assist you with some indoor air quality problems. See www.vdh.state.va.us/LHD/LocalHealthDistricts.asp for the health department office in your area. Other excellent sources of information on indoor air quality can be found on EPA's website at www.epa.gov/iaq/index.html and through the American Lung Association website at www.lungusa.org.

Criteria Pollutants

$PM_{2.5}$ is particulate matter (PM) that is less than or equal to 2.5 micrometers (a micrometer is one millionth of a meter) in aerometric diameter. These particles are often called “fine particles” because of their small size. Fine particles originate from a variety of man-made stationary and mobile sources, such as factory smoke stacks and diesel engines, as well as from natural sources, such as forest fires. These particles may be emitted directly into the air, or they may be formed by chemical reaction in the atmosphere from gaseous emissions of sulfur dioxide (SO2), nitrogen oxides (NOx), and volatile organic compounds (VOCs).

Scientific research has linked fine particle pollution to human health problems. The particles are easily inhaled deep into the lungs, and can actually enter the bloodstream. Particle pollution is of particular concern to people with heart or lung disease, such as coronary artery disease, congestive heart failure, asthma, or chronic obstructive pulmonary disease (COPD). Older adults are at risk because they may have underlying, undiagnosed heart or lung problems. Young children are also at risk because their lungs are still developing, they are more likely to have asthma or acute respiratory disease, and they tend to spend longer periods of time at high activity levels, causing them to inhale more particles than someone at rest. Even otherwise healthy people may suffer short-term symptoms such as eye, nose, throat irritation, coughing, and shortness of breath during episodes of high particulate levels.

$PM_{2.5}$ air quality standards were implemented by EPA in 1997 to protect against the health effects of fine particle pollution. In addition to health problems, fine particle pollution contributes to haze that causes deterioration of visibility in scenic areas, and also deposits harmful compounds on the soil and water. Unlike ozone, which is a seasonal pollutant in most areas of the country, particle pollution can occur year-round, and is monitored throughout the year in Virginia. The Virginia DEQ $PM_{2.5}$ monitoring network uses three different types of samplers to monitor fine particulate in the state:

$PM_{2.5}$ 24-hour Mass Sampler: This Federal Reference Method (FRM) sampler collects particulate matter on a stretched Teflon filter media. Three samplers (Henrico Co., Virginia Beach, and Fairfax Co.) collect 24-hour samples every day. The rest of these samplers collect 24-hour samples on a one-in-three day schedule. Filters are retrieved from the field and shipped via courier to the Virginia Division of Consolidated Laboratories in Richmond. At the laboratory, the filters are equilibrated for a minimum of 24 hours prior to the final weighing.

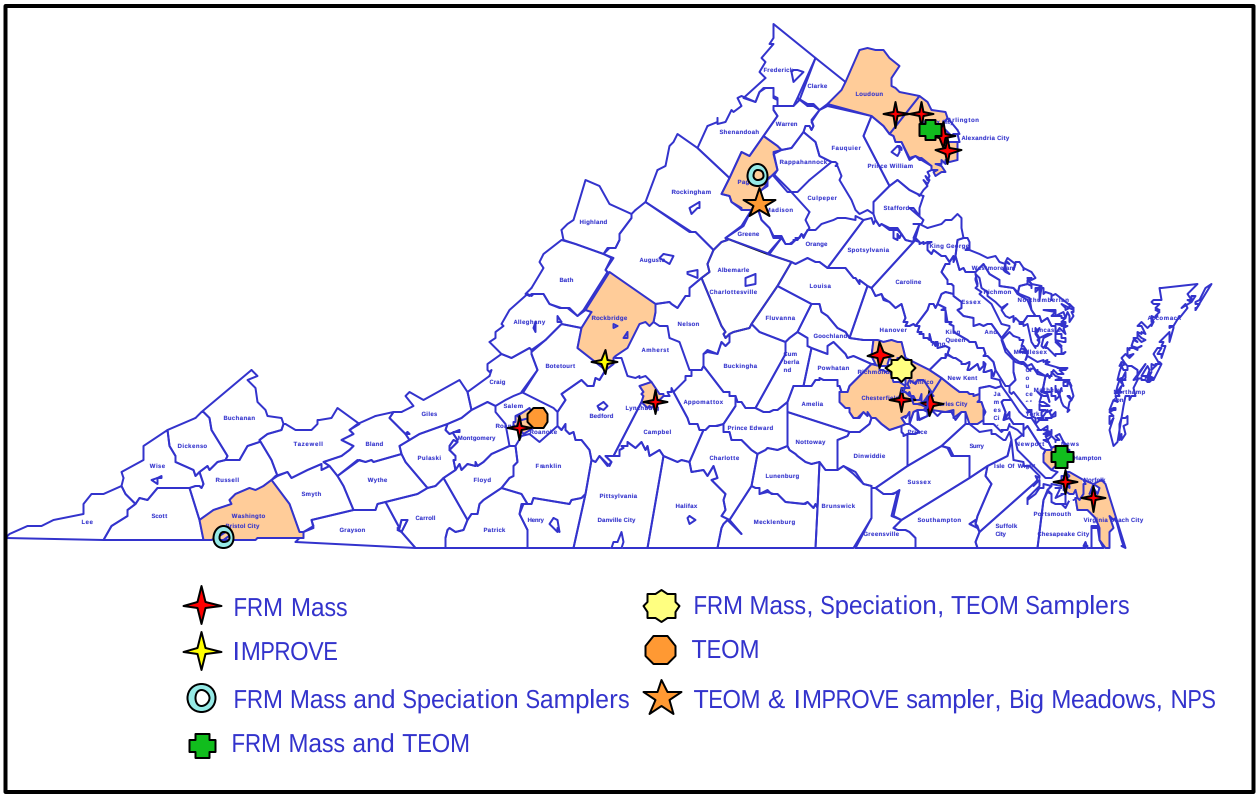
$PM_{2.5}$ 24-hour Speciation Sampler: This sampler collects particulate matter on nylon, Teflon, and quartz filters in three sampling modules. These modules are picked up by the operator after the sampling period, and shipped refrigerated to the EPA contract laboratory. The lab analyzes the filters for mass loading, trace elements (such as aluminum, antimony, arsenic, barium, bromine, and zirconium), cations (ammonium, potassium, sodium), anions (nitrate, sulfate), and carbons (carbonate carbon, elemental carbon, and organic carbon). The Henrico Co. speciation monitor operates on a one-in-three day sampling schedule, and the Bristol and Luray monitors operate on a one-in-six day schedule.

$PM_{2.5}$ Continuous Monitor: This sampler collects particulate samples on a continuous basis, and data are compiled into hourly averages. The sampler utilizes a Tapered Element Oscillating Microbalance (TEOM) in the sampling design. TEOM samplers are operated in Hampton, Henrico Co., Roanoke, Fairfax Co., and Big Meadows in Shenandoah National Park.

Each type of $PM_{2.5}$ sampler has a unique function. The FRM samplers collect data that are used to determine if the state is complying with the national ambient air quality standards (NAAQS) for particulate matter. The speciation sampler collects data about the composition of particulate matter in Virginia, and is useful for identifying potential sources of air pollution both within and outside the state boundaries. The FRM and speciation monitors are manual, filter-based methods, and the samples they collect must be transported to a laboratory for processing. Consequently, they are not useful for reporting real-time air quality conditions. The TEOM is a continuous particulate monitor that provides hourly data on fine particulate levels. The data are polled each hour by a central computer at DEQ, and then used to compute the current air quality index, which is posted on the agency website at www.deq.virginia.gov/airquality . The data are also simultaneously sent to EPA's national air quality website at www.airnow.gov .

In addition to the $PM_{2.5}$ network operated by the DEQ, the National Park Service and the USDA Forest Service operate $PM_{2.5}$ samplers at Big Meadows in Shenandoah National Park, and in Rockbridge Co. as part of the IMPROVE (Interagency Monitoring of Protected Visual Environments) network. This network employs different sampling methods than those used by the DEQ. Data for the IMPROVE network can be found on the internet at http://vista.cira.colostate.edu/improve .

$PM_{2.5}$ Monitoring Network



NAAQS Standards

Primary Standard for $PM_{2.5}$:
- Annual Arithmetic Mean 3-year average = 15 µg/m^3.
- 24-Hour concentration 3-year average of the 98th percentile 24-hour average = 65 µg/m^3.

Secondary Standard for $PM_{2.5}$:
- Same as Primary.

2003-2005 $PM_{2.5}$ Weighted Annual Arithmetic Means (units in µg/m^3)				
Site	**2003**	**2004**	**2005**	**3-Year Average**
(101-E) **Bristol**	13.8	13.9	14.3	14.0
(29-D) **Luray**	12.4	12.1	14.0	12.8
(109-L) **Roanoke**	13.5	13.5	15.1	14.1
(110-B) **Salem**	13.8	14.3	16.0	14.7
(155-Q) **Lynchburg**	NA	12.1	13.4	NA
(71-D) **Chesterfield Co.**	13.6	13.2	14.0	13.6
(72-M) **Henrico Co.**	14.0	13.6	13.9	13.8
(72-N) **Henrico Co.**	12.8	12.5	13.7	13.0
(75-B) **Charles City Co.**	12.4	12.2	12.9	12.5
(179-C) **Hampton**	12.4	12.2	12.5	12.4
(181-A1) **Norfolk**	12.8	12.7	13.5	13.0
(184-J) **Va. Beach**	12.8	12.4	12.6*	12.6
(38-I) **Loudoun Co.**	13.1	14.1	14.6	13.9
(46-B9) **Franconia, Fairfax Co.**	13.2	13.9	13.5	13.5
(47-T) **Arlington**	14.1	14.5	15.3	14.6
(L-46-A8) **McLean, Fairfax Co.**	13.6	14.0	14.8	14.1
(L-46-C1) **Annandale, Fairfax Co.**	13.2	13.7	14.4	13.8

* *Did not meet EPA's minimum requirements for data capture.*
NA - *Not Available due to insufficient data.*

NAAQS Standards

Primary Standard for $PM_{2.5}$:

- Annual Arithmetic Mean 3-year average = 15 $\mu g/m^3$.
- 24-Hour concentration 3-year average of the 98th percentile 24-hour average = 65 $\mu g/m^3$.

Secondary Standard for $PM_{2.5}$:

- Same as Primary.

2003-2005 $PM_{2.5}$ 24-Hour Averages, 98th Percentile Values (units in $\mu g/m^3$)				
Site	**2003**	**2004**	**2005**	**3-Year Average**
(101-E) **Bristol**	30.2	30.2	30.6	30.3
(29-D) **Luray**	33.6	27.2	32.0	30.9
(109-L) **Roanoke**	32.0	32.2	35.4	33.2
(110-B) **Salem**	32.2	33.0	37.0	34.1
(155-Q) **Lynchburg**	NA	28.0	35.1	NA
(71-D) **Chesterfield Co.**	37.6	29.8	30.4	32.6
(72-M) **Henrico Co.**	36.4	30.2	32.2	32.9
(72-N) **Henrico Co.**	31.7	28.1	29.0	29.6
(75-B) **Charles City Co.**	36.0	28.9	31.4	32.1
(179-C) **Hampton**	32.8	27.9	26.9	29.2
(181-A1) **Norfolk**	31.9	28.2	29.6	29.9
(184-J) **Va. Beach**	32.6	27.9	29.9*	30.1
(38-I) **Loudoun Co.**	35.3	34.2	37.7	35.7
(46-B9) **Franconia, Fairfax Co.**	32.6	35.3	34.5	34.1
(47-T) **Arlington**	39.2	35.7	34.2	36.4
(L-46-A8) **McLean, Fairfax Co.**	32.9	33.7	34.6	33.7
(L-46-C1) **Annandale, Fairfax Co.**	36.7	34.0	35.1	35.3

* *Did not meet EPA's minimum requirements for data capture.*
NA - *Not Available due to insufficient data.*

3-Day Monitoring Schedule for PM2.5 2005

January

Su	M	Tu	W	Th	F	Sa
						1
2	3	**4**	5	6	**7**	8
9	**10**	11	12	**13**	14	15
16	17	18	**19**	20	21	**22**
23	24	**25**	26	27	**28**	29
30	**31**					

February

Su	M	Tu	W	Th	F	Sa
		1	2	**3**	4	5
6	7	8	**9**	10	11	**12**
13	14	**15**	16	17	**18**	19
20	**21**	22	23	**24**	25	26
27	28					

March

Su	M	Tu	W	Th	F	Sa
		1	**2**	3	4	**5**
6	7	**8**	9	10	**11**	12
13	**14**	15	16	**17**	18	19
20	21	22	**23**	24	25	**26**
27	28	**29**	30	31		

April

Su	M	Tu	W	Th	F	Sa
					1	2
3	**4**	5	6	**7**	8	9
10	11	12	**13**	14	15	**16**
17	18	**19**	20	21	**22**	23
24	**25**	26	27	**28**	29	30

May

Su	M	Tu	W	Th	F	Sa
1	2	3	**4**	5	6	**7**
8	9	**10**	11	12	**13**	14
15	**16**	17	18	**19**	20	21
22	23	24	**25**	26	27	**28**
29	30	**31**				

June

Su	M	Tu	W	Th	F	Sa
			1	2	**3**	4
5	**6**	7	8	**9**	10	11
12	13	14	**15**	16	17	**18**
19	20	**21**	22	23	**24**	25
26	**27**	28	29	**30**		

July

Su	M	Tu	W	Th	F	Sa
					1	2
3	4	5	**6**	7	8	**9**
10	11	**12**	13	14	**15**	16
17	**18**	19	20	**21**	22	23
24	25	26	**27**	28	29	**30**
31						

August

Su	M	Tu	W	Th	F	Sa
	1	**2**	3	4	**5**	6
7	**8**	9	10	**11**	12	13
14	15	16	**17**	18	19	**20**
21	22	**23**	24	25	**26**	27
28	**29**	30	31			

September

Su	M	Tu	W	Th	F	Sa
				1	2	3
4	5	6	**7**	8	9	**10**
11	12	**13**	14	15	**16**	17
18	**19**	20	21	**22**	23	24
25	26	27	**28**	29	30	

October

Su	M	Tu	W	Th	F	Sa
						1
2	3	**4**	5	6	**7**	8
9	**10**	11	12	**13**	14	15
16	17	18	**19**	20	21	**22**
23	24	**25**	26	27	**28**	29
30	**31**					

November

Su	M	Tu	W	Th	F	Sa
		1	2	**3**	4	5
6	7	8	**9**	10	11	**12**
13	14	**15**	16	17	**18**	19
20	**21**	22	23	**24**	25	26
27	28	29	**30**			

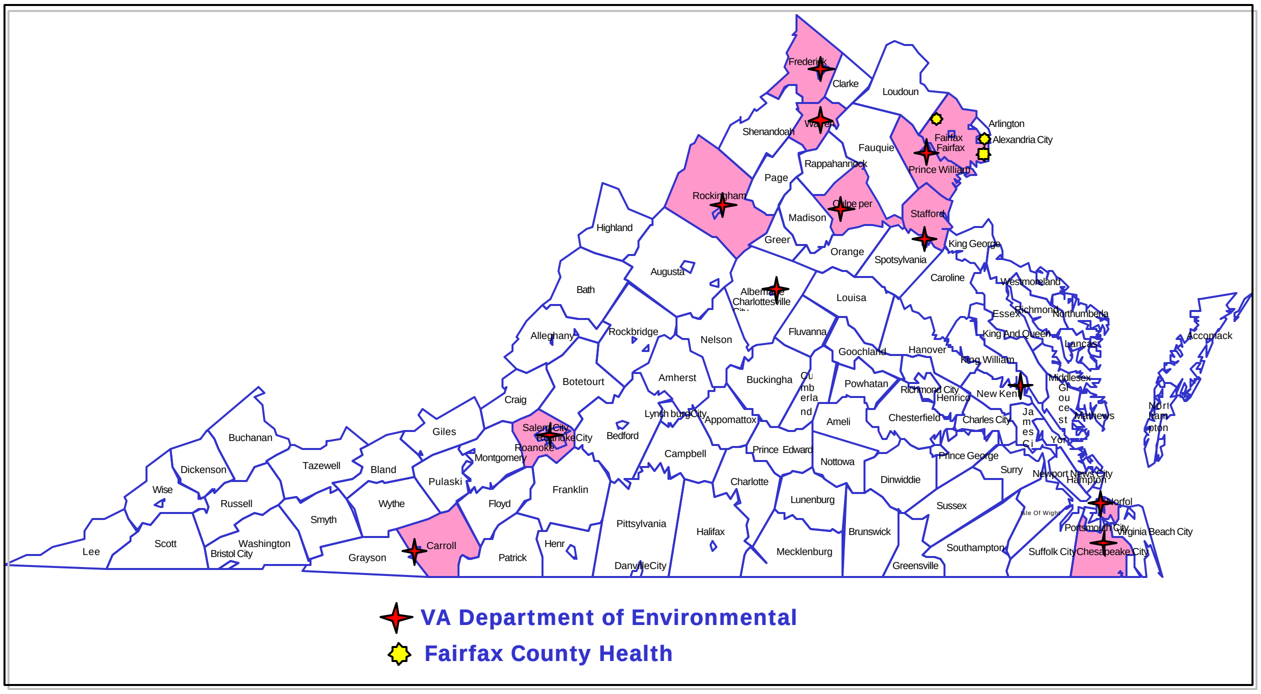
December

Su	M	Tu	W	Th	F	Sa
				1	2	**3**
4	5	**6**	7	8	**9**	10
11	**12**	13	14	**15**	16	17
18	19	20	**21**	22	23	**24**
25	26	**27**	28	29	**30**	31

PM_{10} is particulate matter comprised of solid particles or liquid droplets with an aerodynamic diameter of less than or equal to 10 micrometers, and is sometimes referred to as "coarse particles." PM_{10} particles are larger than $PM_{2.5}$, but are still in a size range that can pose health problems because they can be inhaled and retained in the human respiratory system, causing breathing difficulties, and eye, nose and throat irritation. In addition to the health effects of PM_{10}, these particles can impair visibility, can contribute to climate change, and result in "acidic dry deposition." Acidic dry deposition occurs when particles containing acidic compounds fall to the ground. The acidic particles can corrode surfaces that they settle on, and can increase the acidity of the soil and water.

The national ambient air quality standards, or NAAQS, for particulate matter were last changed in 1997, when standards for $PM_{2.5}$ were added. Since that time, EPA has reviewed public health studies on particulate matter, and is proposing changes to the NAAQS for particulate matter as a result of those studies. The revisions that EPA is proposing would change the standard for PM_{10} to $PM_{10-2.5}$, also called "inhalable coarse particles." In addition, EPA is proposing to reduce the allowable level of coarse particulate matter in the air. The new standards for particulate matter are scheduled to be announced in September 2006.

To measure $PM_{10,}$ ambient air is drawn into a sampler that uses a particle size discrimination inlet. The inlet is designed so that particles in the size range of 10 micrometers (also called microns) or below stay suspended in the air stream, while larger particles settle out of the air. The sample air flows across an 8 x 10 inch micro-quartz filter at a rate of 40 cubic feet per minute for a 24-hour period. The particles are captured on the filter, which is weighed before and after sampling, and the PM_{10} concentration is determined by dividing the change in filter mass by the volume of sampled air. The resulting PM_{10} concentration is reported as micrograms per cubic meter (ug/m^3). The filters are processed at the DEQ Office of Air Quality Monitoring, except for the samples collected by Fairfax County, which performs their own analyses. The normal sampling schedule is once every sixth day from midnight to midnight.



NAAQS Standards

Primary Standard for PM_{10}:

- Annual Arithmetic Mean, 3-year average of the weighted annual mean not to exceed 50 µg/m^3.
- 24-Hour concentration not to exceed 150 µg/m^3 more than once per year.

Secondary Standard for PM_{10}:

- Same as Primary.

2003-2005 PM_{10} Weighted Annual Arithmetic Means (units in µg/m^3)				
Site	**2003**	**2004**	**2005**	**3-Year Average**
(23-A) **Carroll Co.**	15	14	17	15
(26-F) **Rockingham Co. ****	NA	NA	21	NA
(30-E) **Warren Co.**	17	17	19	18
(127-B) **Charlottesville**	17	19	22	19
(134-C) **Winchester**	18	18	20	19
(109-H) **Roanoke**	30	29	30	30
(82-C) **King William Co.**	16	NA	23	NA
(181-A1) **Norfolk**	17	18	20	18
(42-B) **Culpeper Co.**	16	17	19	17
(130-E) **Fredericksburg**	16	18	19	18
(L-46-B3) **Mt. Vernon, Fairfax Co.**	18*	21	21	20
(L-46-F) **Chantilly, Fairfax Co.**	15	16	19	13

* *Did not meet EPA's minimum requirements for data capture.*
** *Installed in 2004.*
NA - *Not Available due to insufficient data.*

6-Day Monitoring Schedule for PM10 2005

January

Su	M	Tu	W	Th	F	Sa
						1
2	3	**4**	5	6	7	8
9	**10**	11	12	13	14	15
16	17	18	19	20	21	**22**
23	24	25	26	27	**28**	29
30	31					

February

Su	M	Tu	W	Th	F	Sa
		1	2	**3**	4	5
6	7	8	**9**	10	11	12
13	14	**15**	16	17	18	19
20	**21**	22	23	24	25	26
27	28					

March

Su	M	Tu	W	Th	F	Sa
		1	2	3	4	**5**
6	7	8	9	10	**11**	12
13	14	15	16	**17**	18	19
20	21	22	**23**	24	25	26
27	28	**29**	30	31		

April

Su	M	Tu	W	Th	F	Sa
					1	2
3	**4**	5	6	7	8	9
10	11	12	13	14	15	**16**
17	18	19	20	21	**22**	23
24	25	26	27	**28**	29	30

May

Su	M	Tu	W	Th	F	Sa
1	2	3	**4**	5	6	7
8	9	**10**	11	12	13	14
15	**16**	17	18	19	20	21
22	23	24	25	26	27	**28**
29	30	31				

June

Su	M	Tu	W	Th	F	Sa
			1	2	**3**	4
5	6	7	8	**9**	10	11
12	13	14	**15**	16	17	18
19	20	**21**	22	23	24	25
26	**27**	28	29	30		

July

Su	M	Tu	W	Th	F	Sa
					1	2
3	4	5	6	7	8	**9**
10	11	12	13	14	**15**	16
17	18	19	20	**21**	22	23
24	25	26	**27**	28	29	30
31						

August

Su	M	Tu	W	Th	F	Sa
	1	**2**	3	4	5	6
7	**8**	9	10	11	12	13
14	15	16	17	18	19	**20**
21	22	23	24	25	**26**	27
28	29	30	31			

September

Su	M	Tu	W	Th	F	Sa
				1	2	3
4	5	6	**7**	8	9	10
11	12	**13**	14	15	16	17
18	**19**	20	21	22	23	24
25	26	27	28	29	30	

October

Su	M	Tu	W	Th	F	Sa
						1
2	3	4	5	6	**7**	8
9	10	11	12	**13**	14	15
16	17	18	**19**	20	21	22
23	24	**25**	26	27	28	29
30	**31**					

November

Su	M	Tu	W	Th	F	Sa
		1	2	3	4	5
6	7	8	9	10	11	**12**
13	14	15	16	17	**18**	19
20	21	22	23	**24**	25	26
27	28	29	**30**			

December

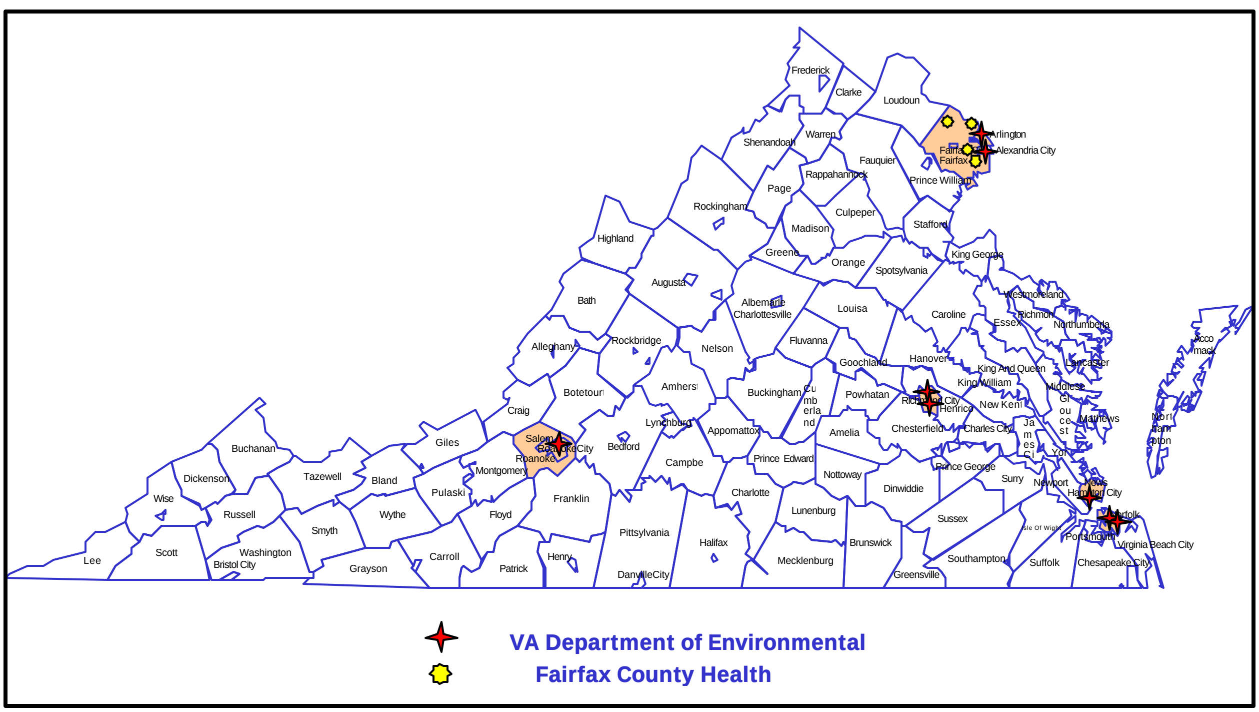
Su	M	Tu	W	Th	F	Sa
				1	2	3
4	5	**6**	7	8	9	10
11	**12**	13	14	15	16	17
18	19	20	21	22	23	**24**
25	26	27	28	29	**30**	31

Carbon monoxide (CO) is a colorless, odorless gas that is produced by incomplete burning of carbon compounds in fossil fuels (gasoline, natural gas, coal, oil, etc.). Over half of the CO emissions in the country come from motor vehicle exhaust. Other sources include construction equipment, boats, lawnmowers, woodstoves, forest fires, and industrial manufacturing processes.

CO concentrations are higher in the vicinity of heavily traveled highways, and drop rapidly the further the distance from the road. Ambient levels of carbon monoxide tend to be higher in the colder months due to “thermal inversions” that trap pollutants close to the ground. A thermal inversion occurs when the temperature of the air next to the ground is colder than air above it. When this happens, the air resists vertical mixing that can help the pollutants to disperse, forming a layer of smog close to the ground.

Carbon monoxide is harmful because it reacts in the bloodstream, reducing the amount of oxygen that is supplied to the heart and brain. CO can be harmful at lower levels to people who suffer from cardiovascular disease, like angina, arteriosclerosis, or congestive heart failure. At high levels, CO can impair brain function, causing vision problems, reduced manual dexterity, and reduced ability to perform complicated tasks. At very high levels, carbon monoxide can be deadly.

Carbon monoxide in the ambient air is measured continuously with an electronic instrument that uses NDIR, “non-dispersive infrared” photometry. The instrument has a pump that continuously draws air through a sample chamber that contains an infrared light source and a detector. Any CO molecules that are present in the sample air absorb some of the infrared light, reducing the intensity of the light reaching the detector. The portion of the infrared light absorbed by the CO molecules is converted into an electrical signal corresponding to the CO concentration, and stored in the instrument computer.



NAAQS Standards

Primary Standard for CO:

- 8-hour average not to exceed 9 ppm (10 mg/m^3) more than once per year.
- 1-hour average not to exceed 35 ppm (40 mg/m^3) more than once per year.

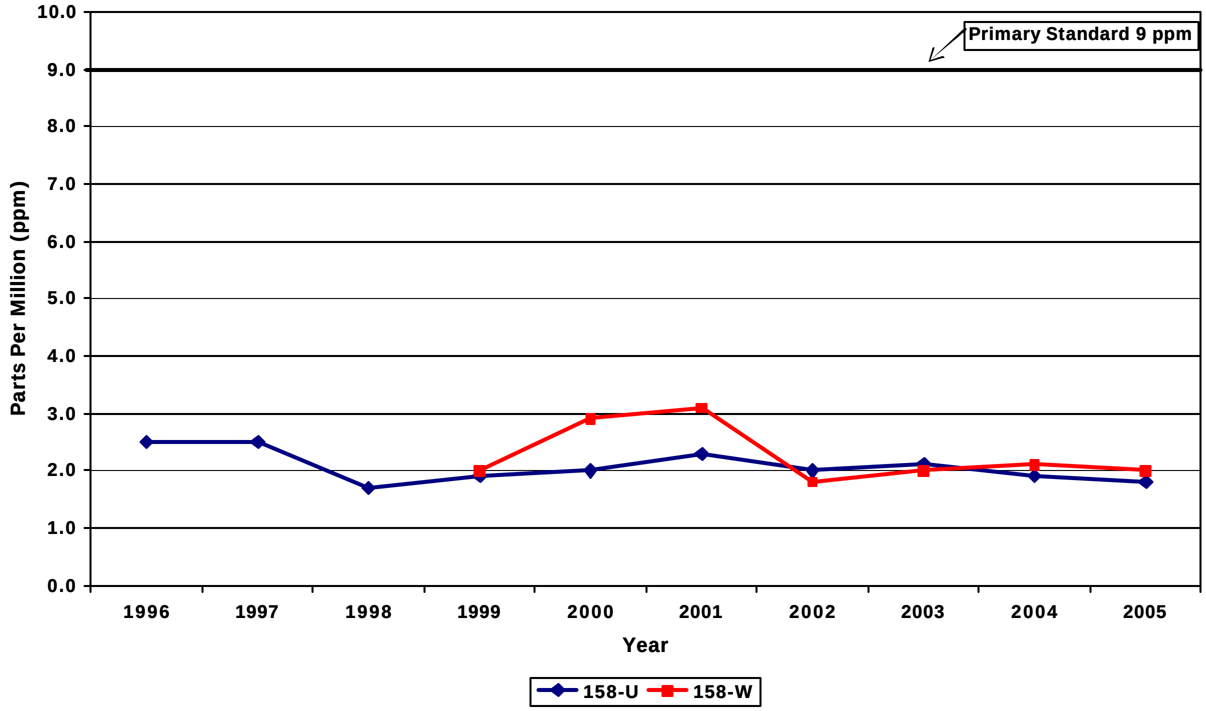
There are no Secondary Standards for CO because it does not harm vegetation or buildings.

CO Monitoring Locations and 2005 Max. Values:

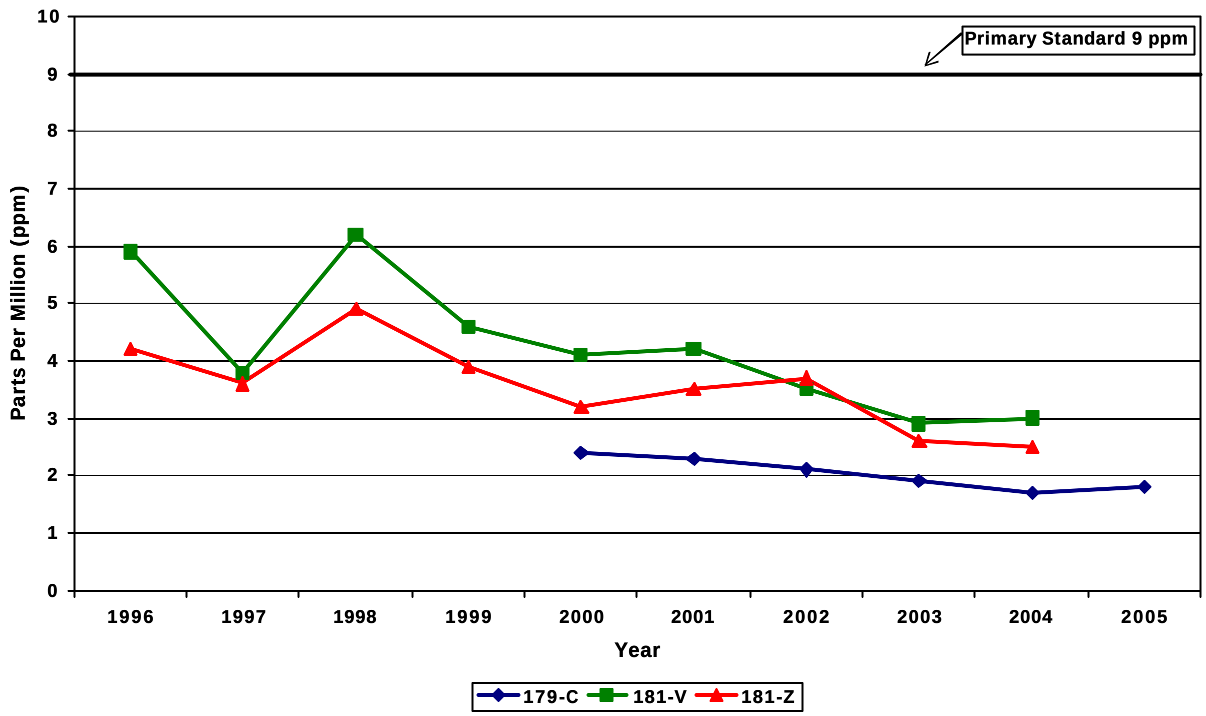
Site	1-Hour Avg.		8-Hour Avg.	
	1st Max.	2nd Max.	1st Max.	2nd Max.
(109-M) **Roanoke**	3.1	3.0	2.4	2.2
(158-U) **Richmond**	3.2	3.2	1.9	1.8
(158-W) **Richmond**	2.8	2.8	2.4	2.0
(179-C) **Hampton**	4.8	3.6	1.8	1.8
(46-B9) **Franconia**	2.0	1.9	1.7	1.3
(47-T) **Arlington Co.**	2.4	2.3	1.8	1.6
(L-46-A8) **Fairfax Co.**	2.6	2.5	2.0	1.9
(L-46-C1) **Fairfax Co.**	1.9	1.6	1.4	1.3
(L-46-F) **Fairfax Co.**	2.7	1.7	1.5	1.5
(L-126-C) **Alexandria**	2.3	2.3	1.7	1.6

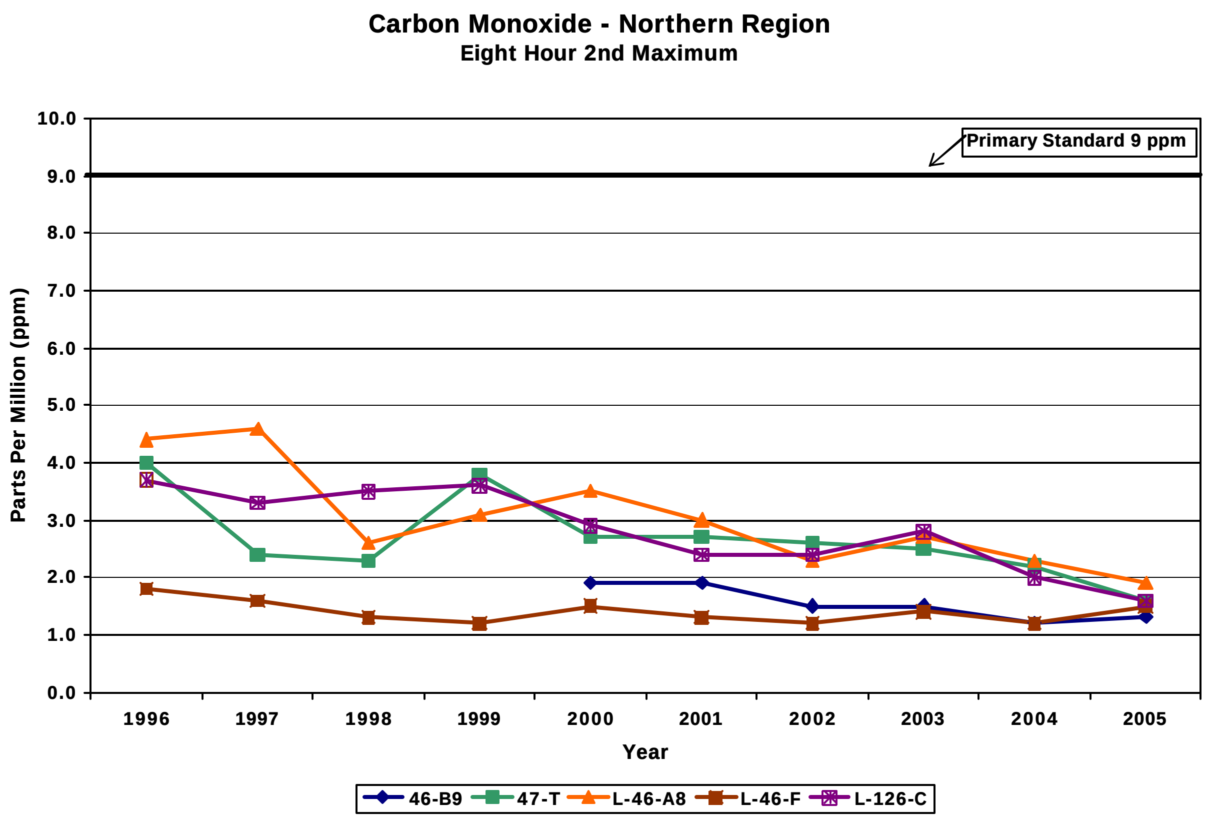
* *Eight Hour Averages stated as Ending Hour*

Carbon Monoxide - Piedmont Region
Eight Hour 2nd Maximum



Carbon Monoxide - Tidewater Region
Eight Hour 2nd Maximum



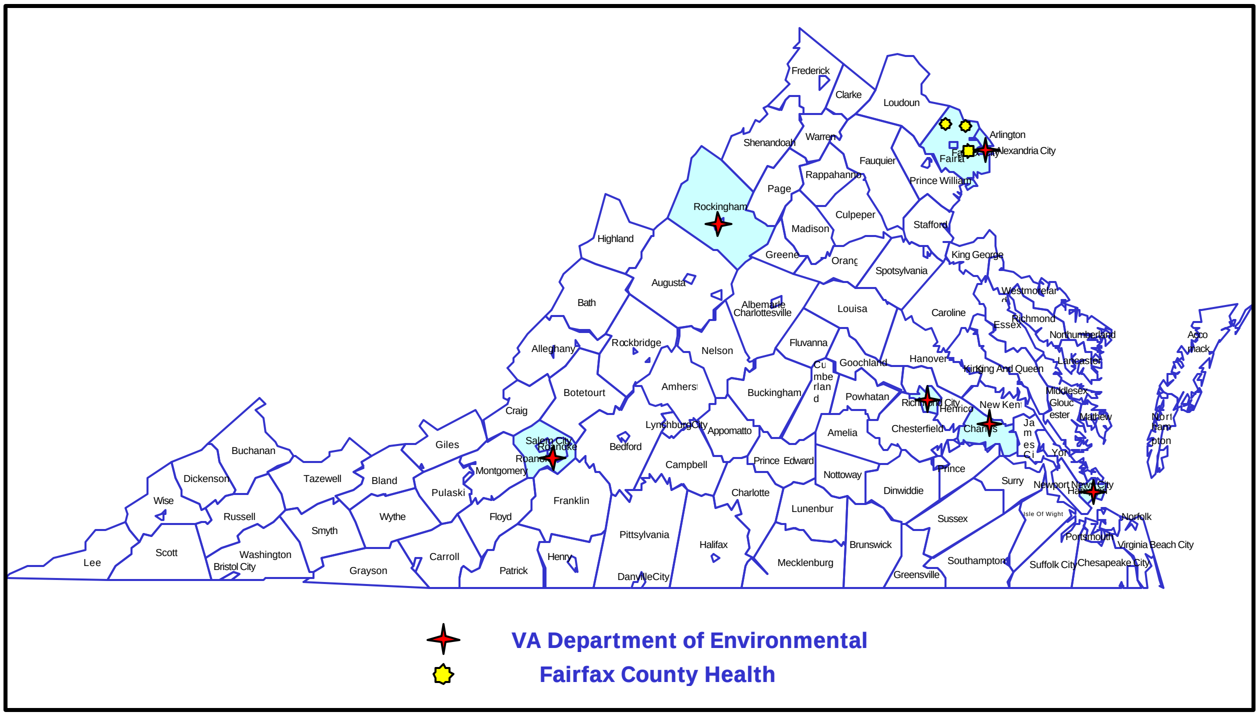

Carbon Monoxide - Northern Region
Eight Hour 2nd Maximum
Primary Standard 9 ppm
Parts Per Million (ppm)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
Year
46-B9
47-T
L-46-A8
L-46-F
L-126-C

Sulfur Dioxide (SO_2) is a colorless gas that has a strong odor. It results from burning of fuels containing sulfur (such as coal and oil), petroleum refining, and smelting (extracting metals from ore), and it also occurs naturally from volcanic eruptions. SO_2 can dissolve in water vapor to produce sulfuric acid, and it can also interact with other gases and particles in the air to produce sulfate aerosols that are capable of traveling long distances in the atmosphere.

EPA has developed primary and secondary air quality standards for SO_2. The primary standards are designed to protect people from the health effects of sulfur dioxide gas, which include respiratory problems for people with asthma and for those who are active outdoors. Long-term exposure to high concentrations of sulfur dioxide gas can cause respiratory illness and aggravate existing heart conditions. Sulfate particles that are formed from SO_2 gas can be inhaled, and are associated with increased respiratory symptoms and disease.

Secondary standards for sulfur dioxide protect against damage to vegetation and buildings, and against decreased visibility. The acids that can form from SO_2 and water vapor contribute to acid deposition (commonly called “acid rain”) which causes damage to the leaves of plants and trees, making them vulnerable to disease, and can increase the acidity of lakes and streams, making them unsuitable for aquatic life. Acid deposition also causes deterioration of materials on buildings, monuments, and sculptures. Finally, small sulfate particles, formed when SO_2 gas reacts with other gases and particles in the air, contribute to haze that causes decreased visibility in many areas of the country.

Sulfur dioxide is monitored continuously with an electronic instrument using ultraviolet fluorescence detection. The instrument has a pump that pulls outside air into a sample chamber containing a high intensity ultraviolet (UV) light. Any SO_2 molecules in the sample air absorb some of the UV light, become excited, and then fluoresce, releasing light characteristic of SO_2. The fluorescence is detected with a photomultiplier tube (a tube that detects very small amounts of light and multiplies the signal many times), and the resulting signal, which corresponds to the amount of SO_2 in the sample, is converted to an SO_2 concentration by the instrument computer.



NAAQS Standards

Primary Standards for SO_2:

- Annual Arithmetic Mean not to exceed 0.03 ppm (80 μg/m^3).
- 24-Hour concentration not to exceed 0.14 ppm (365 μg/m^3) more than once per year.

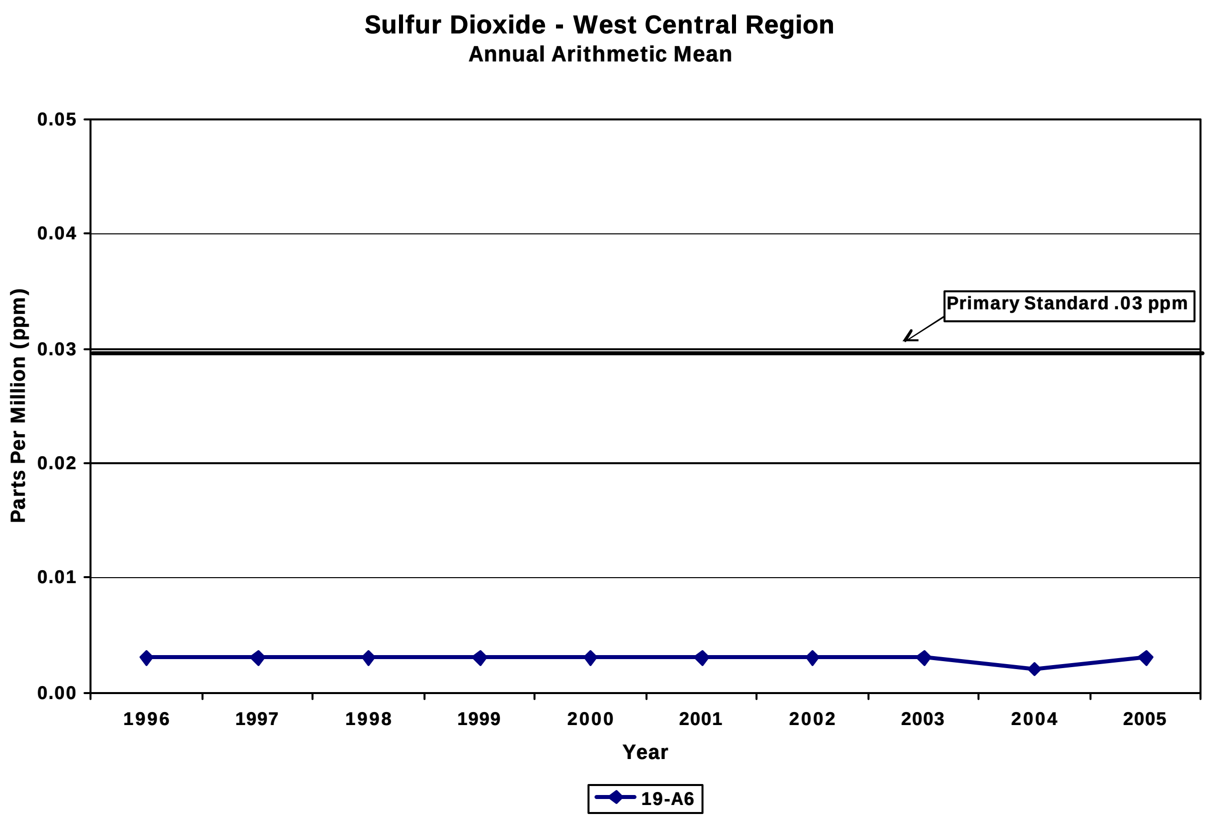
Secondary Standard for SO_2:

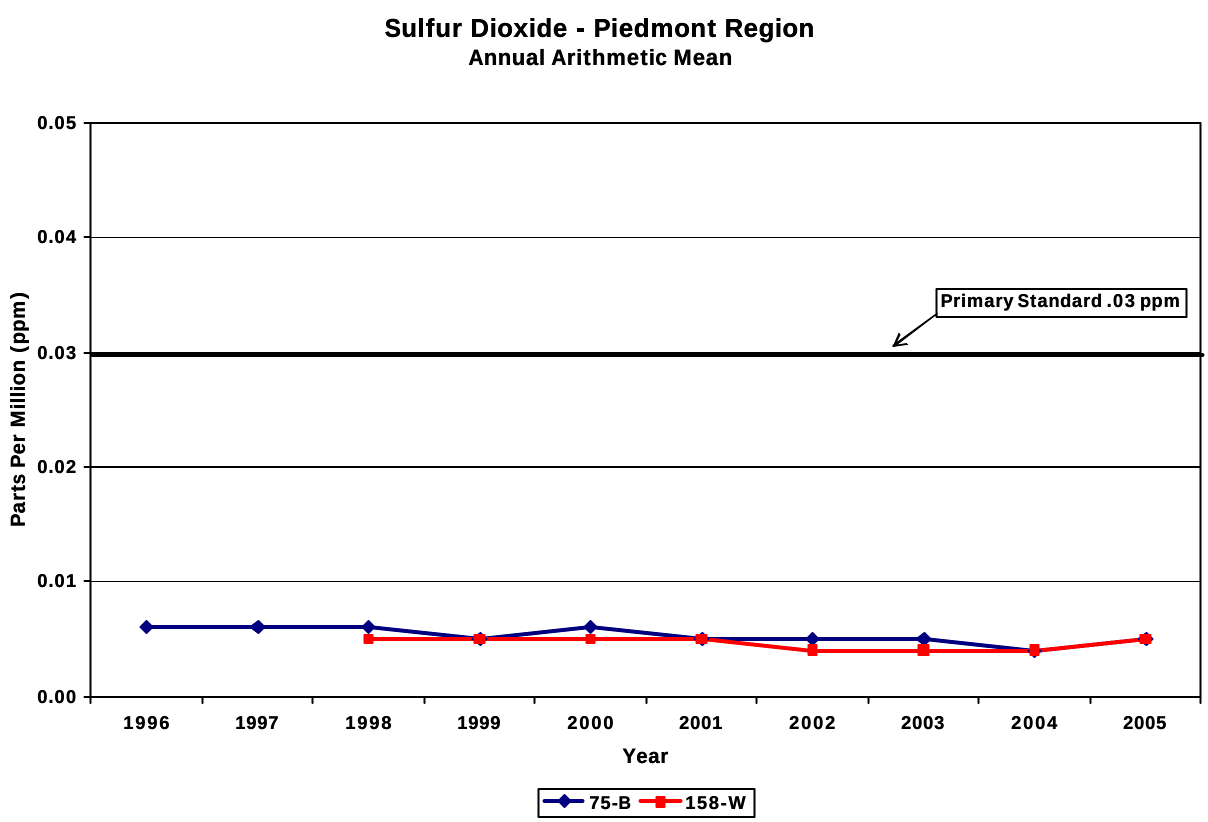
- 3-Hour concentration not to exceed 0.5 ppm (1300 μg/m^3) more than once per year.

Site	24-Hour Avg.		3-Hour Avg.	
	1st Max.	2nd Max.	1st Max.	2nd Max.
(26-F) **Rockingham**	.010	.009	.021	.016
(19-A6) **Vinton**	.010	.009	.022	.013
(75-B) **Charles City Co.**	.018	.016	.065	.062
(158-W) **Richmond**	.017	.016	.054	.048
(179-C) **Hampton**	.015	.013	.044	.038
(L-46-A8) **Fairfax Co.**	.017	.017	.036	.032
(L-46-C1) **Fairfax Co.**	.021	.020	.055	.041
(L-46-F) **Fairfax Co.**	.013	.012	.026	.025
(L-126-C) **Alexandria**	.020	.019	.077	.067

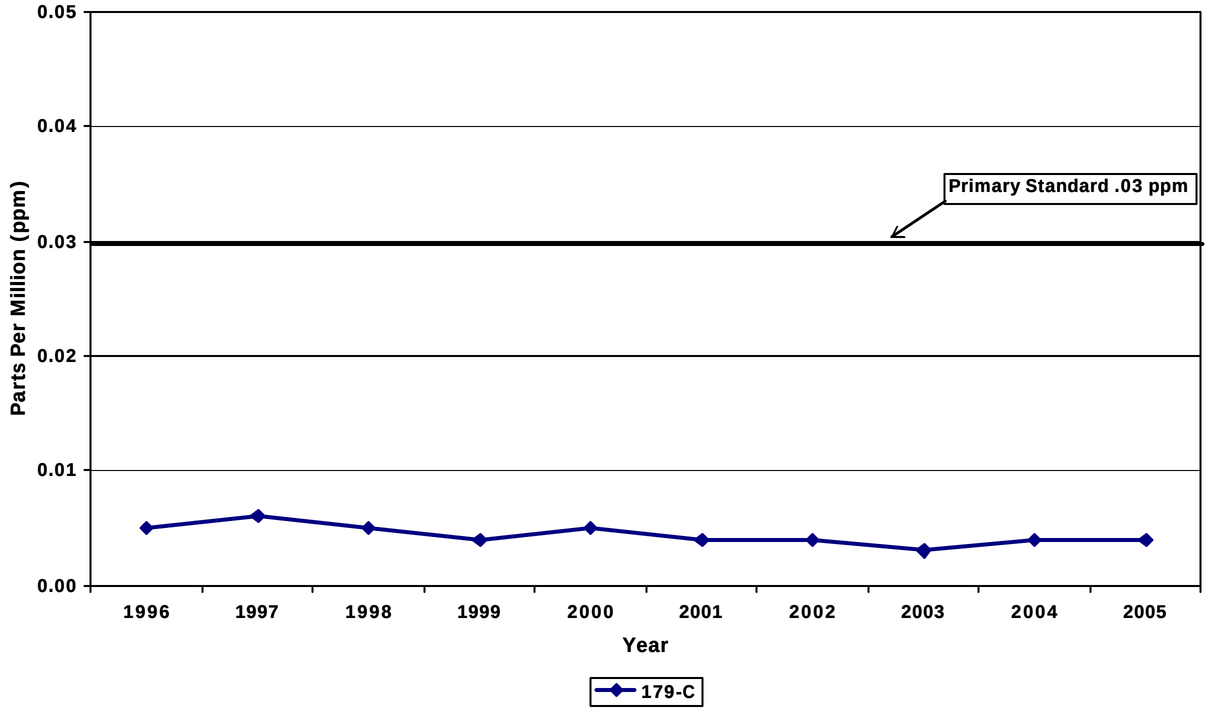
Site	Annual Arithmetic Mean									
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
(26-F) **Rockingham**										.002
(19-A6) **Vinton**	.003	.003	.003	.003	.003	.003	.003	.003	.002	.003
(75-B) **Charles City Co.**	.006	.006	.006	.005	.006	.005	.005	.005	.004	.005
(158-W) **Richmond**			.005	.005	.005	.005	.004	.004	.004	.005
(179-C) **Hampton**	.005	.006	.005	.004	.005	.004	.004	.003	.004	.004
(L-46-A8) **Fairfax Co.**	.007	.008	.010	.009	.011	.007	.007	.005	.006	.006
(L-46-C1) **Fairfax Co.**								.006	.006	.006
(L-46-F) **Fairfax Co.**	.006	.008	*	.006	.008	.004	.004	.003	.003	.003
(L-126-C) **Alexandria**	.007	.007	.006	.005	.006	.006	.006	.006	.006	.005

* *Did not meet EPA's minimum requirements for data capture.*

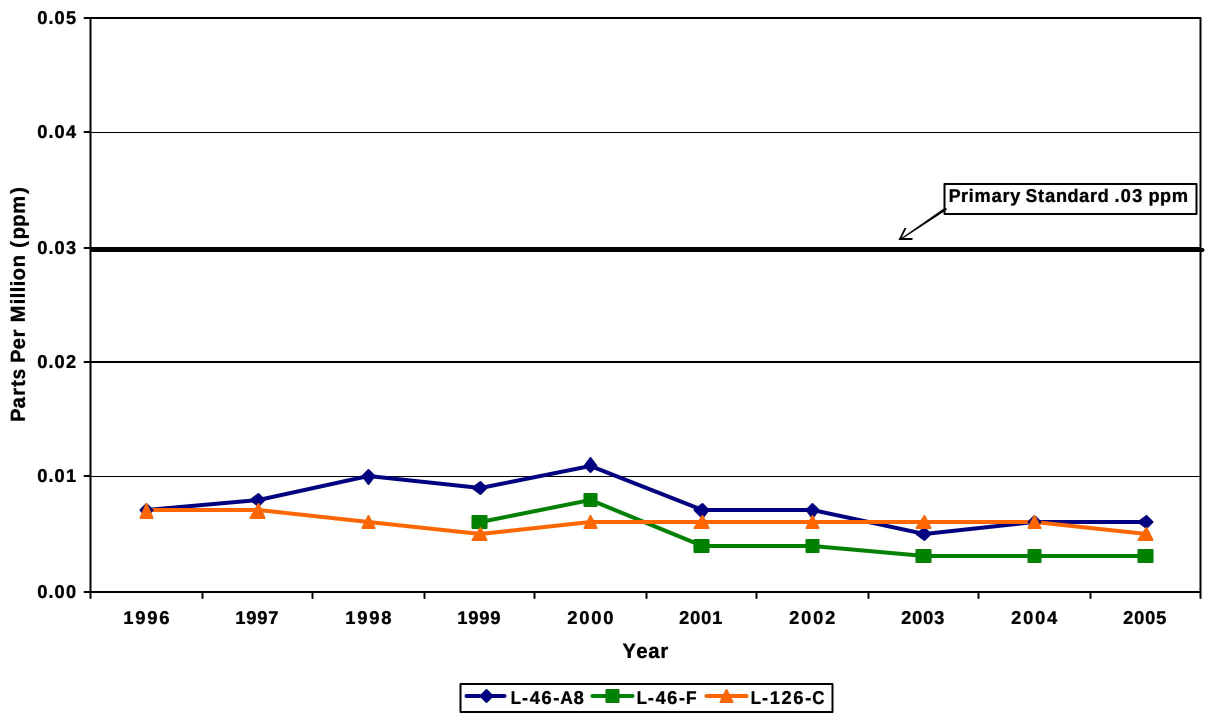

Sulfur Dioxide - West Central Region
Annual Arithmetic Mean
Primary Standard .03 ppm
Parts Per Million (ppm)
0.05
0.04
0.03
0.02
0.01
0.00
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
Year
19-A6


Sulfur Dioxide - Piedmont Region
Annual Arithmetic Mean
Primary Standard .03 ppm
Parts Per Million (ppm)
0.05
0.04
0.03
0.02
0.01
0.00
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
Year
75-B
158-W

Sulfur Dioxide - Tidewater Region
Annual Arithmetic Mean



Sulfur Dioxide - Northern Region
Annual Arithmetic Mean

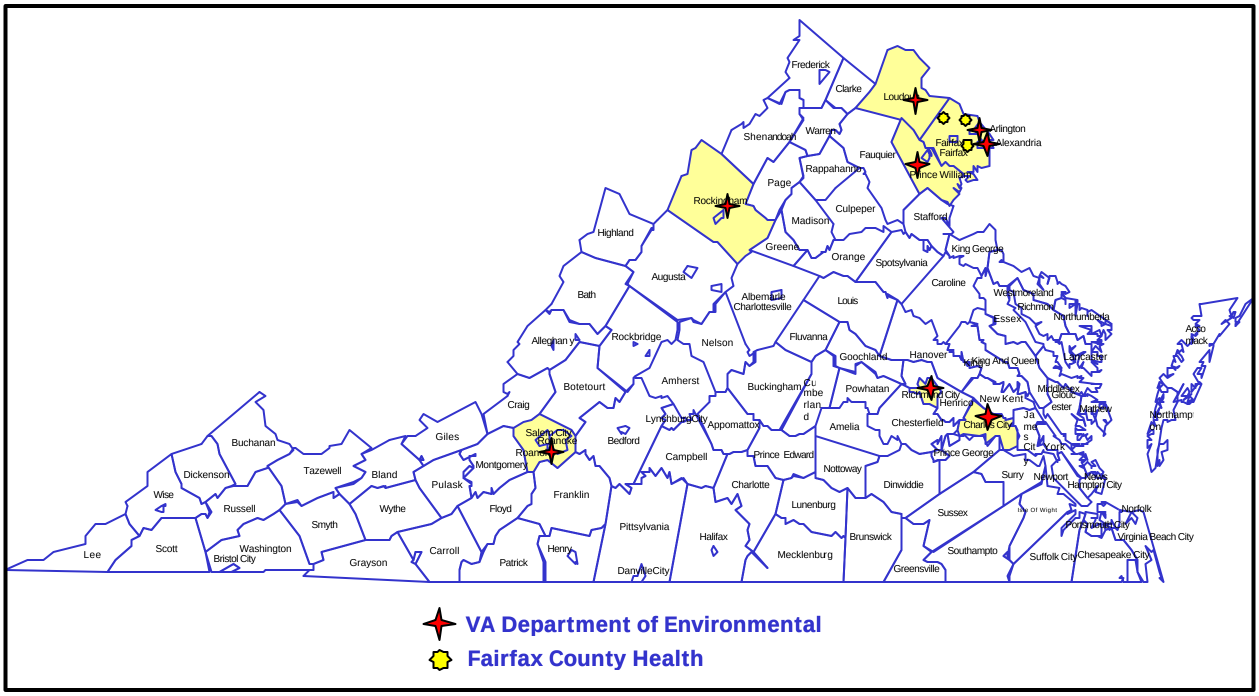


Nitrogen dioxide (NO_2) is one in a group of gases referred to as oxides of nitrogen (NO_X). Nitrogen dioxide, which is characterized by a reddish-brown color and pungent odor, along with the other NO_X gases, results from high-temperature burning of fossil fuels in automobiles, power plants, and other industrial, commercial, and residential sources. NO_X can occur naturally from lightning, forest fires, and bacterial processes that take place in soil.

NO_X pollution contributes to a wide range of problems in the environment. Ground-level ozone, a major component of "smog", forms when NO_X and volatile organic compounds (VOCs) react in the presence of sunlight. NO_X also reacts with other gases and particles in the air to form acids that contribute to acid deposition, and to form small particles that can be inhaled into the lungs. NO_X contributes to water quality deterioration by depositing nitrogen into water bodies, upsetting the nutrient balance and causing oxygen depletion in the water so that fish and other aquatic life cannot survive. Nitrate particles and nitrogen dioxide also contribute to visibility impairment by blocking light transmission.

EPA has established primary and secondary air quality standards for NO_2 because it can cause lung irritation and respiratory problems in humans. Small particles formed from reaction of NO_X gases with other compounds can be inhaled deep into the lungs and cause or worsen respiratory conditions such as emphysema and bronchitis, and can aggravate existing heart conditions.

Nitrogen oxides are measured continuously with electronic instruments using the "gas phase chemiluminescence" method. The instrument has a pump that draws ambient air into a reaction chamber. Inside the chamber, the air is mixed with a high concentration of ozone (O_3). Any nitric oxide (NO) present in the sample air reacts with O_3 to produce NO_2. The NO_2 molecules created by the reaction are in an excited state, and emit light characteristic of NO_2 – this is called "chemiluminescence." The light produced in the reaction is detected with a photomultiplier tube, and the resulting signal is converted to a number reflecting the concentration of NO in the ambient air by the instrument computer. The instrument then activates a valve that diverts incoming ambient air into a "converter", which converts any NO_2 in the ambient air to NO by reduction reaction. After the air passes through the converter, it is sent to the reaction chamber where the NO and O_3 react to produce NO_2. The chemilumiscence produced by the reaction is converted to a signal that reflects the concentration of NO_X in the ambient air. The instrument then calculates the NO_2 concentration using the difference between the measured NO and NO_X concentrations.



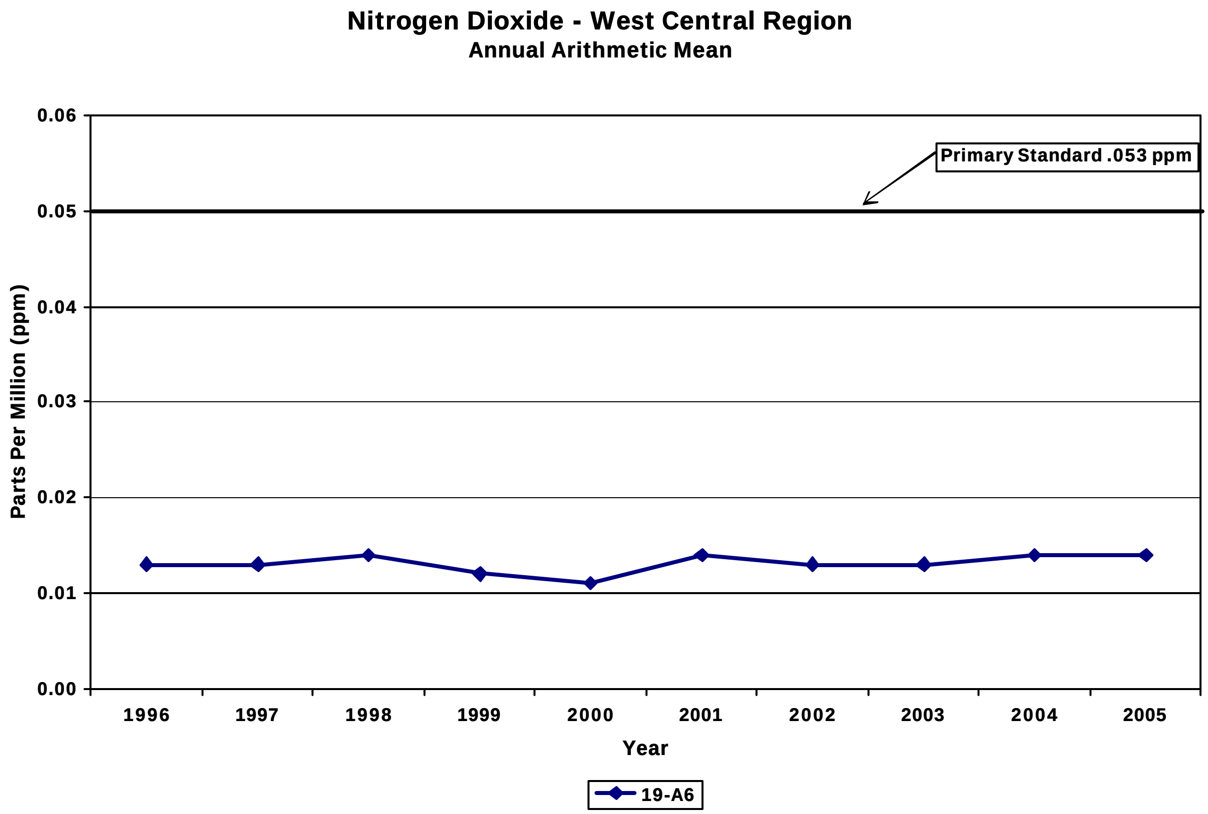
NAAQS Standards

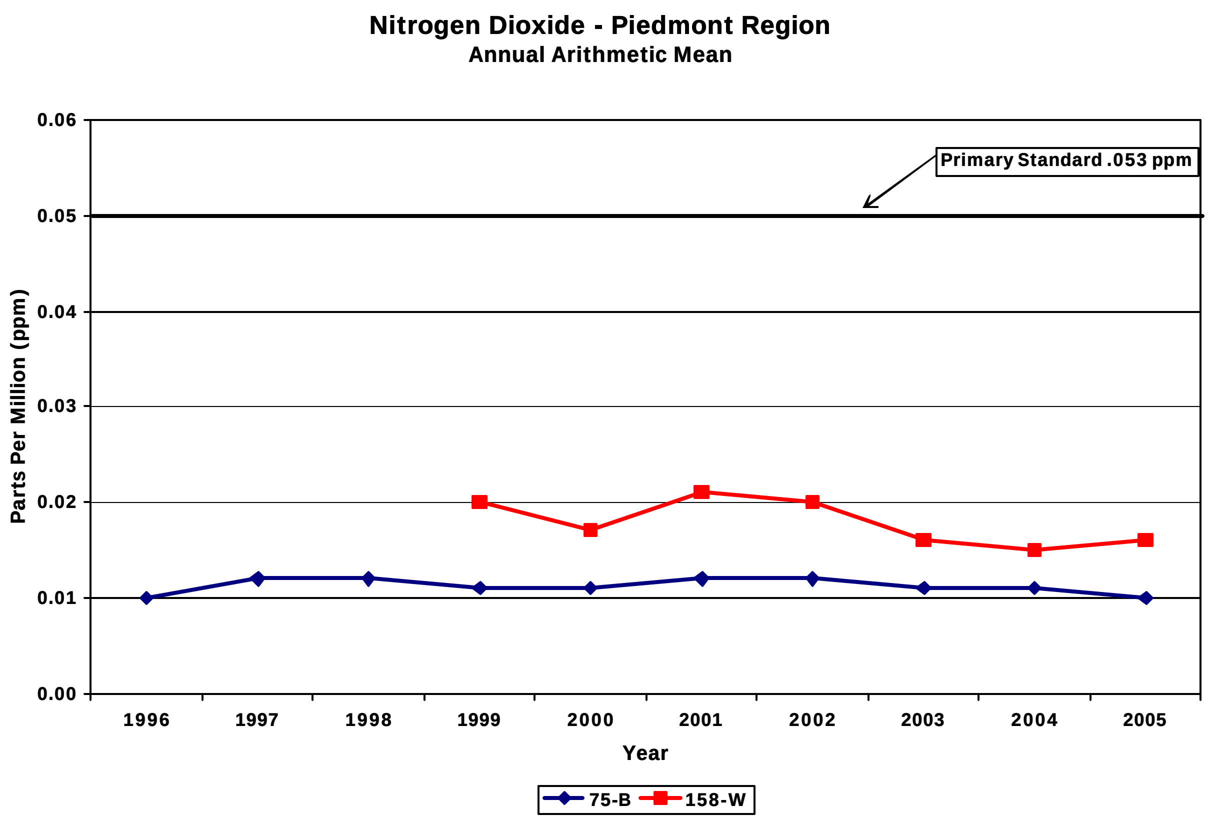
Primary Standard for NO_2:
- Annual Arithmetic Mean not to exceed 0.053 ppm (100 $\mu g/m^3$).

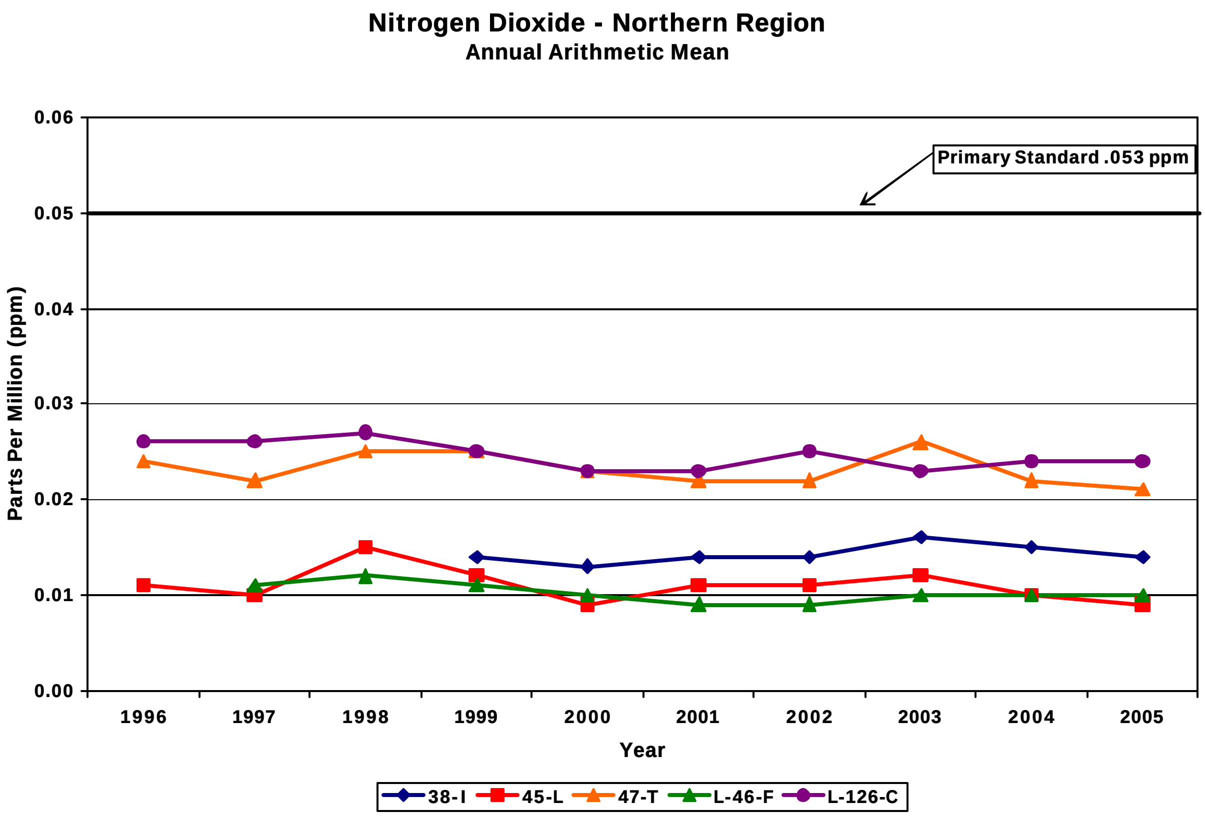
Secondary Standard for NO_2:
- Same as primary.

Site	Annual Arithmetic Mean									
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
(26-F) **Rockingham**										.014
(19-A6) **Vinton**	.013	.013	.014	.012	.011	.014	.013	.013	.014	.014
(75-B) **Charles City Co.**	.010	.012	.012	.011	.011	.012	.012	.011	.011	.010
(158-W) **Richmond**			.021	.020	.017	.021	.020	.016	.015	.016
(38-I) **Ashburn**			.013	.014	.013	.014	.014	.016	.015	.014
(45-L) **Prince William Co.**	.011	.010	.015	.012	.009	.011	.011	.012	.010	.009
(47-T) **Arlington Co.**	.024	.022	.025	.025	.023	.022	.022	.026	.022	.021
(L-46-A8) **Fairfax Co.**	.022	.024	.022	.020	.021	.020	*	*	.018	.017
(L-46-C1) **Fairfax Co.**								.018	.017	.018
(L-46-F) **Fairfax Co.**	*	.011	.012	.011	.010	.009	.009	.010	.010	.010
(L-126-C) **Alexandria**	.026	.026	.027	.025	.023	.023	.025	.023	.024	.024

** Did not meet EPA's minimum requirements for data capture.*


Nitrogen Dioxide - West Central Region
Annual Arithmetic Mean
Primary Standard .053 ppm
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Parts Per Million (ppm)
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
Year
19-A6


Nitrogen Dioxide - Piedmont Region
Annual Arithmetic Mean
Primary Standard .053 ppm
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Parts Per Million (ppm)
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
Year
75-B
158-W


Nitrogen Dioxide - Northern Region
Annual Arithmetic Mean
Primary Standard .053 ppm
Parts Per Million (ppm)
0.06
0.05
0.04
0.03
0.02
0.01
0.00
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
Year
38-I
45-L
47-T
L-46-F
L-126-C

Ozone (O_3) is a gas comprised of three oxygen atoms. It is unstable, and a strong oxidizing agent, and will react readily with other compounds to decay to the more stable diatomic oxygen (O_2).

Ozone can be good or bad, depending on its location in the atmosphere. "Good" ozone occurs naturally in the stratosphere, about 10-30 miles above the earth's surface, where it forms a layer that filters the sun's ultraviolet rays before they reach the surface where they can cause harm to animals and plants. "Bad" ozone, or ground-level ozone, occurs when chemicals found in the atmosphere at earth's surface react in the presence of intense sunlight. Ozone at ground level is harmful because it can cause a variety of health problems, as well as damage to plants and materials. Since ground-level ozone is not emitted directly, it is called a "secondary" pollutant. The chemicals needed to form ozone, NOX and hydrocarbons (also called volatile organic compounds, or VOCs), can come from motor vehicle exhaust, power plants, industrial emissions, gasoline vapors, chemical solvents, as well as natural sources such as lightning, forest fires, and plant decomposition. Ozone, and the chemicals that produce ozone, can travel hundreds of miles from their sources, so that even rural areas with few pollutant emissions can occasionally experience high ozone levels. Efforts to control ground-level ozone involve limiting emissions of NOX and VOCs, or "ozone precursors," that are necessary for ozone production.

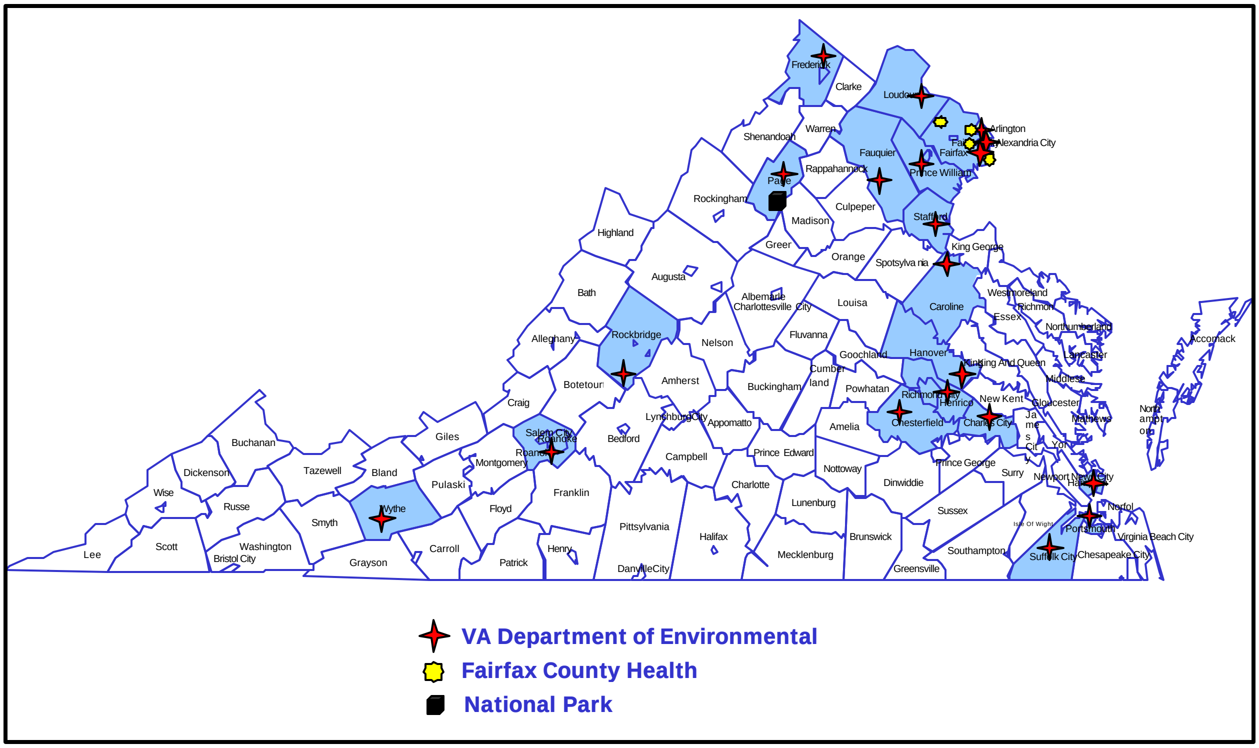
Ground-level ozone is a seasonal pollutant, and the length of the ozone season varies across the country. In some areas, the season may last most of the year, but in Virginia it is usually only a problem during the late spring to summer months when the sunlight is most intense. Virginia is only required to operate its ozone monitors from the months of April to October, although a few sites operate year-round. In addition to the seasonal pattern, ozone also has a strong diurnal (daily) pattern at low altitudes, so that it is usually depressed at night, but begins to build during the day after the sun rises.

EPA has created primary and secondary air quality standards for ground-level ozone because of its adverse affects on public life and welfare. In humans, ozone can irritate lung airways, causing sunburn-like inflammation, and can induce symptoms such as wheezing, coughing, and pain when taking a deep breath. Although people with existing respiratory problems, such as asthma and emphysema, are most vulnerable, young children and otherwise healthy people can also suffer respiratory problems from ozone exposure. Scientific studies have shown that even at low levels, ozone can trigger breathing problems for sensitive individuals. In addition to human health problems, ozone can damage the leaves of plants and trees, making them susceptible to disease, insects, and harsh weather. Ozone can also cause rubber to harden and crack, and some painted surfaces to fade more quickly.

Ozone is measured continuously with electronic instruments using “ultraviolet (UV) absorption photometry.” The method is based on the principle that ozone strongly absorbs UV light at 254 nanometers (a nanometer is equal to a distance of one billionth of a meter). The ozone monitor has a sample pump that draws ambient air into it and splits the air into two gas streams. In one stream, the air passes through an “ozone scrubber”, which cleanses the sample air of any ozone. Then the clean air passes through a sample cell that contains a UV light source and a detector. The detector measures the intensity of the light in the sample cell, providing a zero reference. The second air stream is sent straight into the sample cell, bypassing the scrubber. Any ozone present in the incoming air will absorb some of the UV light in the sample cell, reducing the amount of light reaching the detector. The instrument then calculates the ozone concentration of the ambient air from the difference in the light intensities measured between the scrubbed, or “zero” air, and the unscrubbed air.

Daily ozone forecasts for selected metropolitan areas and hourly ozone values for all Virginia ozone monitoring sites can be viewed for the months of April to October on the DEQ web page at http://www.deq.virginia.gov/airquality . In addition, animated ozone maps for Virginia and other parts of the United States are available at http://www.airnow.gov/ .

The National Park Service operated one ozone monitor at Big Meadows in Shenandoah National Park in 2005. The data from this site may be obtained from the National Park Service, or by internet at http://cfpub.epa.gov/gdm/index.cfm?fuseaction=aciddeposition.wizard .



NAAQS Standards

Primary Standard for O_3:

- Maximum 8-hour average concentration of 0.08 ppm (157 µg/m^3), based on 3-year average of the annual fourth highest daily maximum 8-hour averages.

Secondary Standard for O_3:

- Same as primary.

The standard is attained if the fourth highest daily maximum 8-hour average for each of the three most recent years are averaged, yielding an average less than 0.085 ppm.

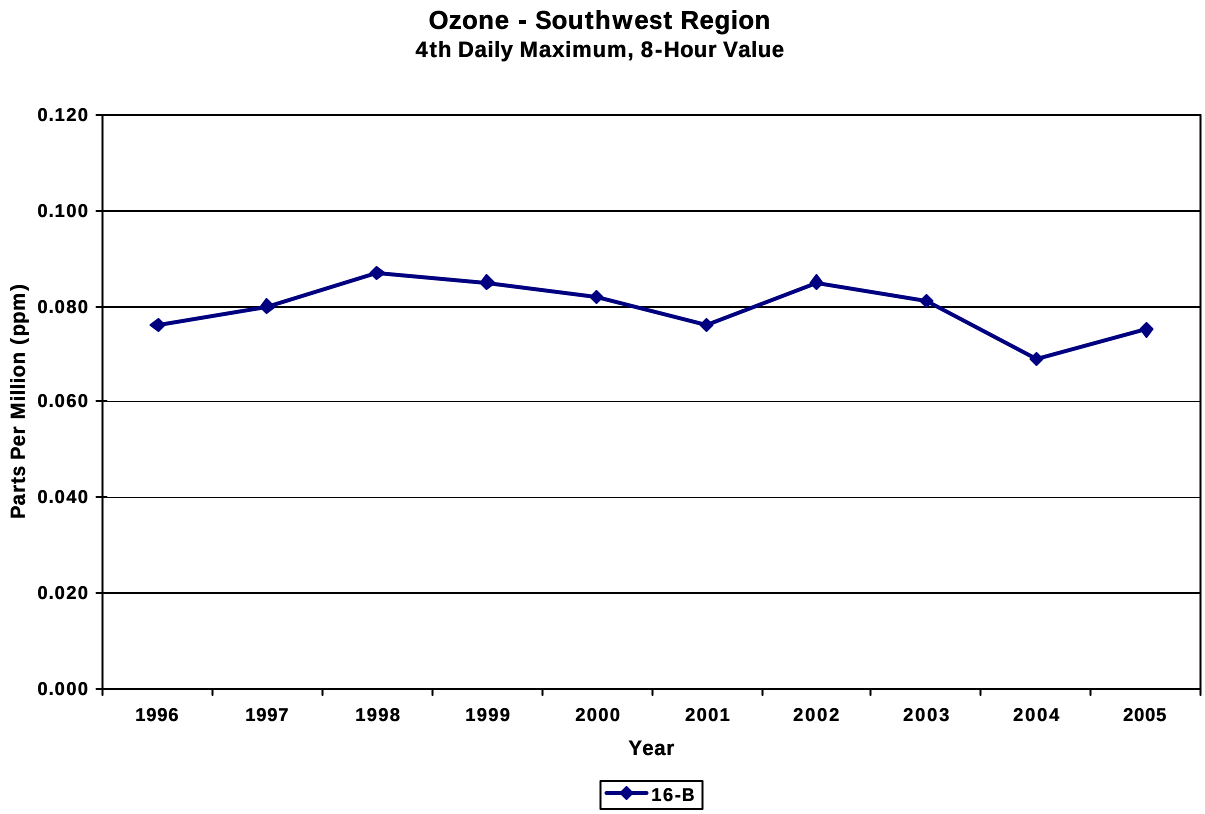
Site	Days Exceeded 0.08 ppm	Highest Daily Maximum 8-Hour Avg.			
		1st Max.	2nd Max.	3rd Max.	4th Max.
(16-B) **Wythe Co.**	0	.084	.078	.078	.075
(28-J) **Frederick Co.**	0	.081	.080	.077	.075
(29-D) **Page Co.**	0	.079	.078	.078	.077
(19-A6) **Roanoke Co.**	0	.079	.078	.077	.076
(21-C) **Rockbridge Co.**	0	.076	.075	.074	.074
(71-H) **Chesterfield Co.**	1	.105	.084	.082	.078
(72-M) **Henrico Co.**	3	.095	.089	.087	.084
(73-E) **Hanover Co.**	2	.093	.089	.083	.083
(75-B) **Charles City Co.**	3	.095	.091	.085	.083
(179-C) **Hampton**	0	.081	.078	.078	.078
(183-E) **Suffolk**	1	.086	.080	.080	.077
(183-F) **Suffolk**	0	.082	.079	.079	.078
(37-B) **Fauquier Co.**	0	.075	.074	.073	.073
(44-A) **Stafford Co.**	0	.084	.083	.081	.079
(45-L) **Prince William Co.**	0	.074	.074	.074	.074
(46-B9) **Fairfax Co.**	6	.095	.092	.088	.088
(47-T) **Arlington Co.**	5	.094	.090	.090	.088
(48-A) **Caroline Co.**	2	.093	.090	.083	.082
(L-46-A8) **Fairfax Co.**	2	.093	.093	.081	.080
(L-46-B3) **Fairfax Co.**	8	.094	.093	.092	.091
(L-46-C1) **Fairfax Co.**	4	.097	.093	.089	.085
(L-46-F) **Fairfax Co.**	0	.084	.077	.076	.076
(L-126-C) **Alexandria**	2	.089	.086	.081	.081

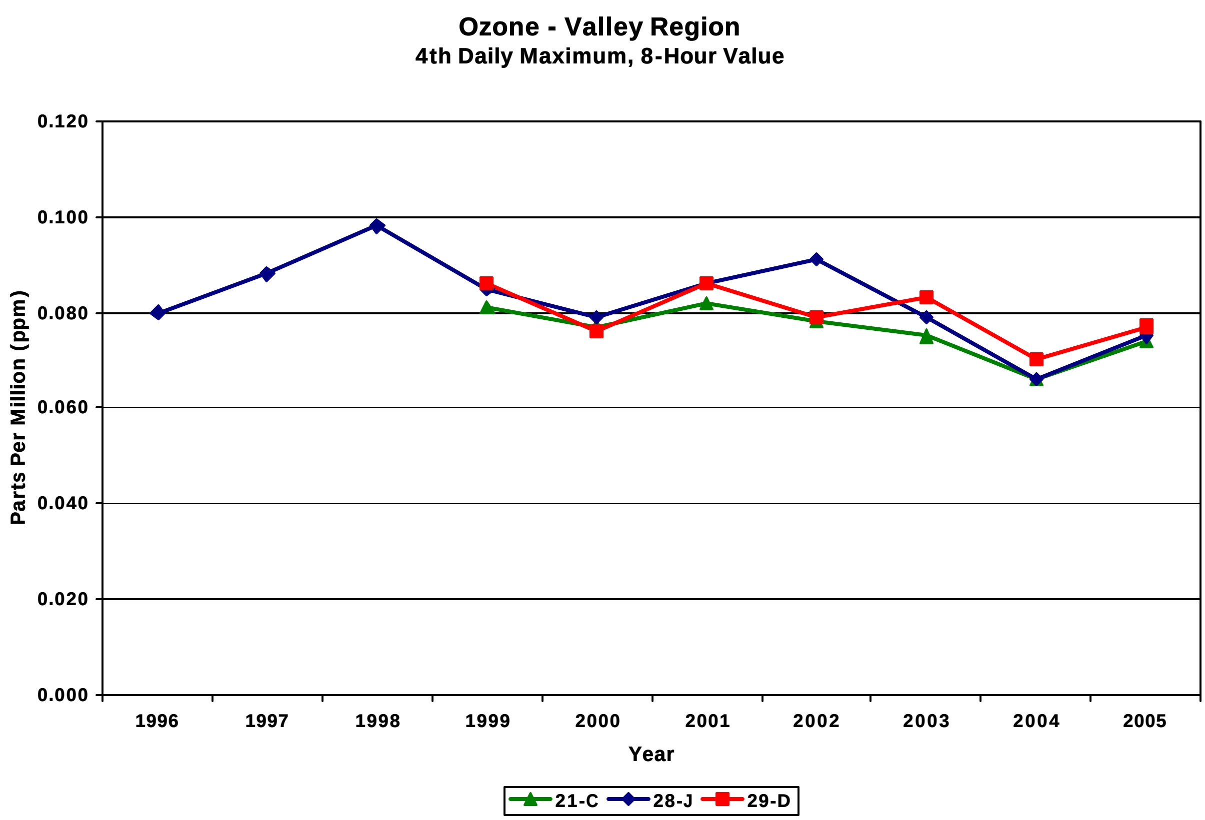
* (38-I) *Loudoun Co., did not meet EPA's minimum requirements for data capture in 2005.*

2003-2005 Fourth-Highest Daily Maximum 8-Hour Ozone Averages (units parts per million)					
	Monitor Location (County/City)	**2003**	**2004**	**2005**	**3-Year Average (NAAQS = .08 ppm)**
Roanoke EAC Area	Roanoke Co.	.077	.071	.076	.074
Richmond Nonattainment Area	Chesterfield Co.	.079	.075	.078	.077
	Henrico Co.	.083	.074	.084	.080
	Hanover Co.	.086	.078	.083	.082
	Charles City Co.	.079	.077	.083	.079
Hampton Roads Nonattainment Area	Hampton City	.083	.074	.078	.078
	Suffolk City (TCC)	.083	.074	.077	.078
	Suffolk City (Holland)	.079	.075	.078	.077
Winchester EAC Area	Frederick Co.	.079	.066	.075	.073
Fredericksburg Nonattainment Area	Stafford Co.	.085	.073	.079	.079
Northern Virginia Nonattainment Area	Loudoun Co.	.083	.080	.077*	.080
	Prince William Co.	.086	.077	.074	.079
	Arlington Co.	.087	.087	.088	**.087**
	Alexandria City	.083	.080	.081	.081
	Fairfax Co. (Lee Park)	.089	.092	.088	**.089**
	Fairfax Co. (McLean)	.075	.084	.080	.079
	Fairfax Co. (Chantilly)	.083	.079	.076	.079
	Fairfax Co. (Annandale)	.083	.091	.085	**.086**
	Fairfax Co. (Mt. Vernon)	.091	.093	.091	**.091**
Shenandoah National Park Nonattainment Area	Madison Co. (Big Meadows)	.086	.075	.080	.080
Areas Currently Designated Attainment	Wythe Co.	.081	.069	.075	.075
	Rockbridge Co.	.075	.066	.074	.071
	Page Co.	.083	.070	.077	.076
	Fauquier Co.	.076	.071	.073	.073
	Caroline Co.	.081	.075	.082	.079

** Loudoun Co. monitor did not meet EPA's minimum requirements for data capture in 2005.*

A 3-year average of .085 ppm or above exceeds the 8-hour NAAQS for ozone. For the period from 2003-2005, the counties of Fairfax and Arlington exceeded the ozone air quality standards.


Ozone - Southwest Region
4th Daily Maximum, 8-Hour Value
0.120
0.100
0.080
0.060
0.040
0.020
0.000
Parts Per Million (ppm)
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
Year
16-B


Ozone - Valley Region
4th Daily Maximum, 8-Hour Value
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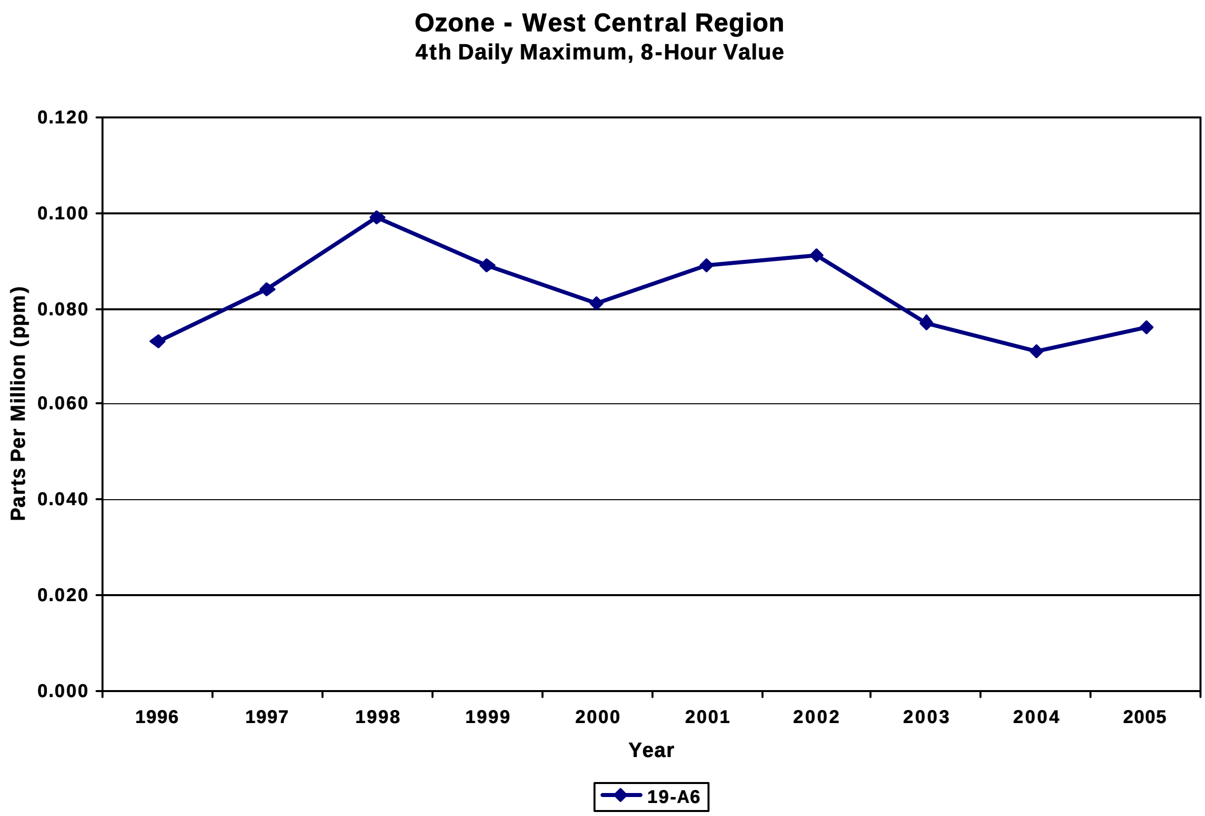
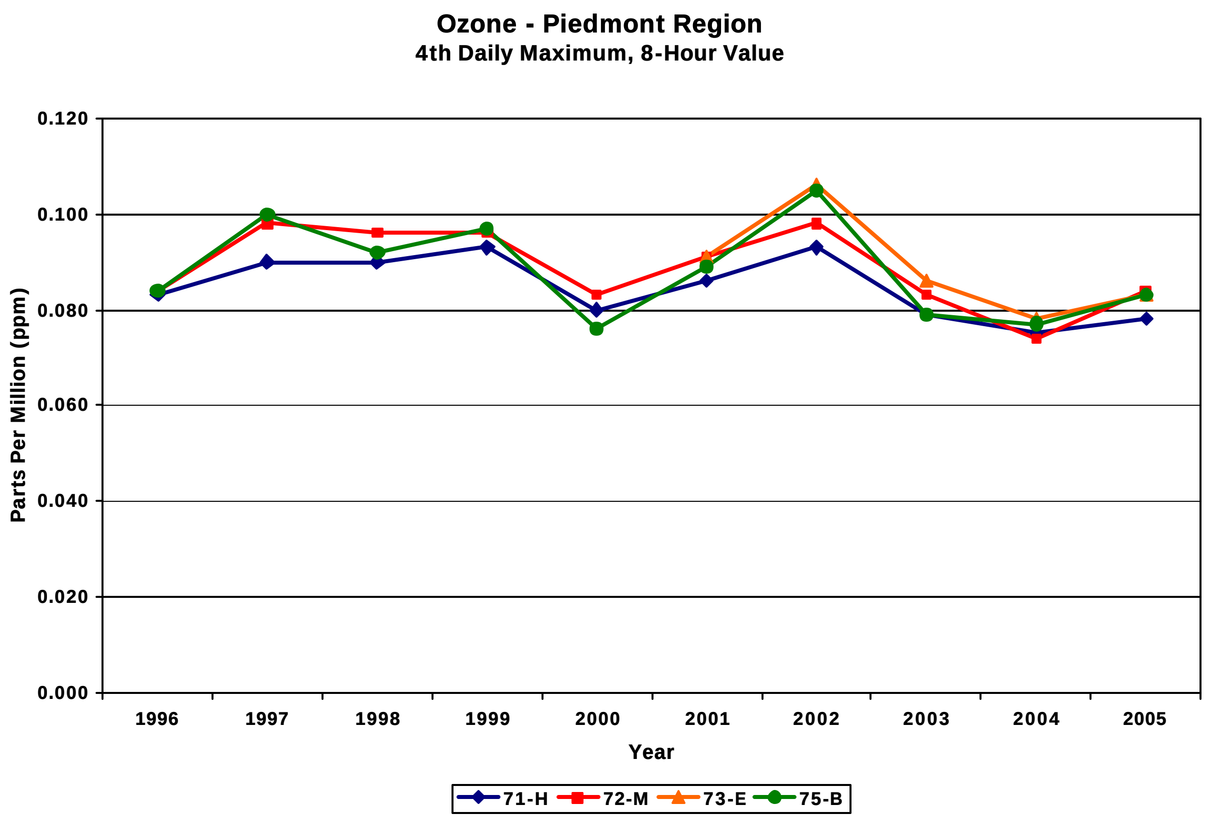
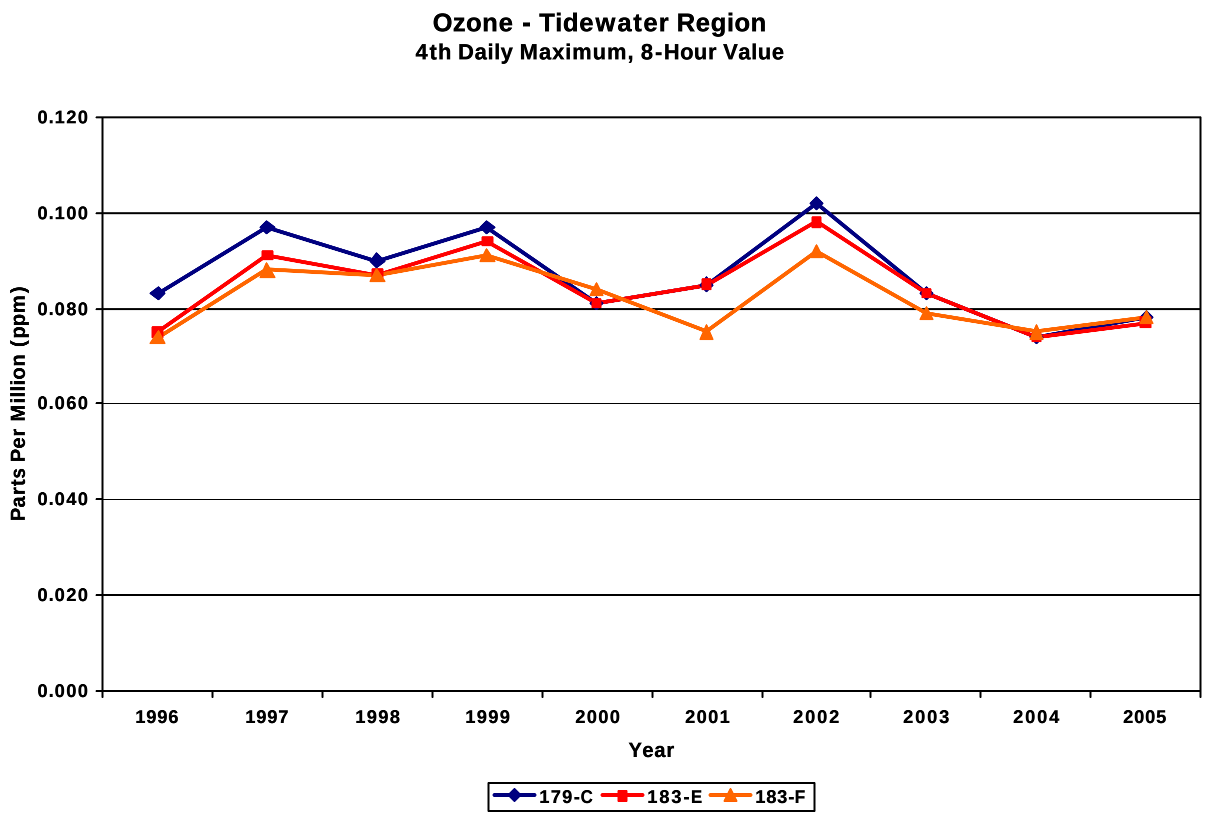
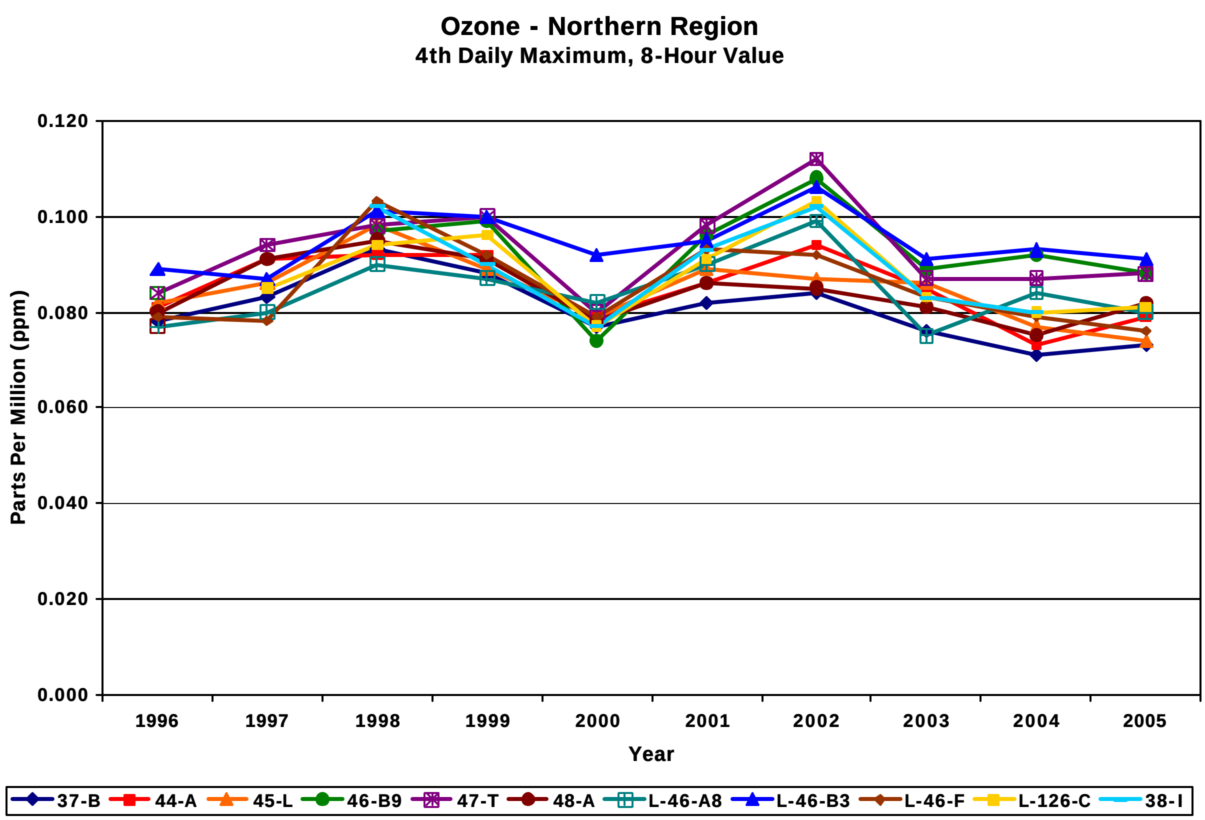
0.100
0.080
0.060
0.040
0.020
0.000
Parts Per Million (ppm)
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
Year
21-C
28-J
29-D


Ozone - West Central Region
4th Daily Maximum, 8-Hour Value
0.120
0.100
0.080
0.060
0.040
0.020
0.000
Parts Per Million (ppm)
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
Year
19-A6


Ozone - Piedmont Region
4th Daily Maximum, 8-Hour Value
0.120
0.100
0.080
0.060
0.040
0.020
0.000
Parts Per Million (ppm)
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
Year
71-H
72-M
73-E
75-B





** (38-I) Loudoun Co. monitor did not meet EPA's minimum requirements for data capture in 2005.*

Site	Days Exceeded 0.12 ppm	Highest Daily Maximum 1-Hour Avg.			
		1st Max.	2nd Max.	3rd Max.	4th Max.
(16-B) **Wythe Co.**	0	.087	.083	.080	.080
(28-J) **Frederick Co.**	0	.092	.086	.086	.085
(29-D) **Page Co.**	0	.087	.085	.084	.081
(19-A6) **Roanoke Co.**	0	.089	.087	.086	.085
(21-C) **Rockbridge Co.**	0	.086	.083	.082	.081
(71-H) **Chesterfield Co.**	0	.113	.106	.095	.095
(72-M) **Henrico Co.**	0	.111	.106	.104	.097
(73-E) **Hanover Co.**	0	.105	.100	.099	.099
(75-B) **Charles City Co.**	0	.116	.107	.106	.100
(179-C) **Hampton**	0	.095	.092	.089	.087
(183-E) **Suffolk**	0	.098	.094	.093	.091
(183-F) **Suffolk**	0	.091	.090	.089	.085
(37-B) **Fauquier Co.**	0	.085	.082	.080	.078
(44-A) **Stafford Co.**	0	.099	.097	.096	.092
(45-L) **Prince William Co.**	0	.089	.087	.086	.084
(46-B9) **Fairfax Co.**	0	.111	.109	.104	.103
(47-T) **Arlington Co.**	0	.114	.106	.102	.102
(48-A) **Caroline Co.**	0	.109	.107	.105	.095
(L-46-A8) **Fairfax Co.**	0	.122	.099	.097	.097
(L-46-B3) **Fairfax Co.**	0	.115	.105	.104	.102
(L-46-C1) **Fairfax Co.**	0	.116	.107	.103	.102
(L-46-F) **Fairfax Co.**	0	.107	.097	.096	.091
(L-126-C) **Alexandria**	0	.107	.104	.103	.098

* *(38-I) Loudoun Co. monitor did not meet EPA's minimum requirements for data capture in 2005.*

Acid Deposition Program

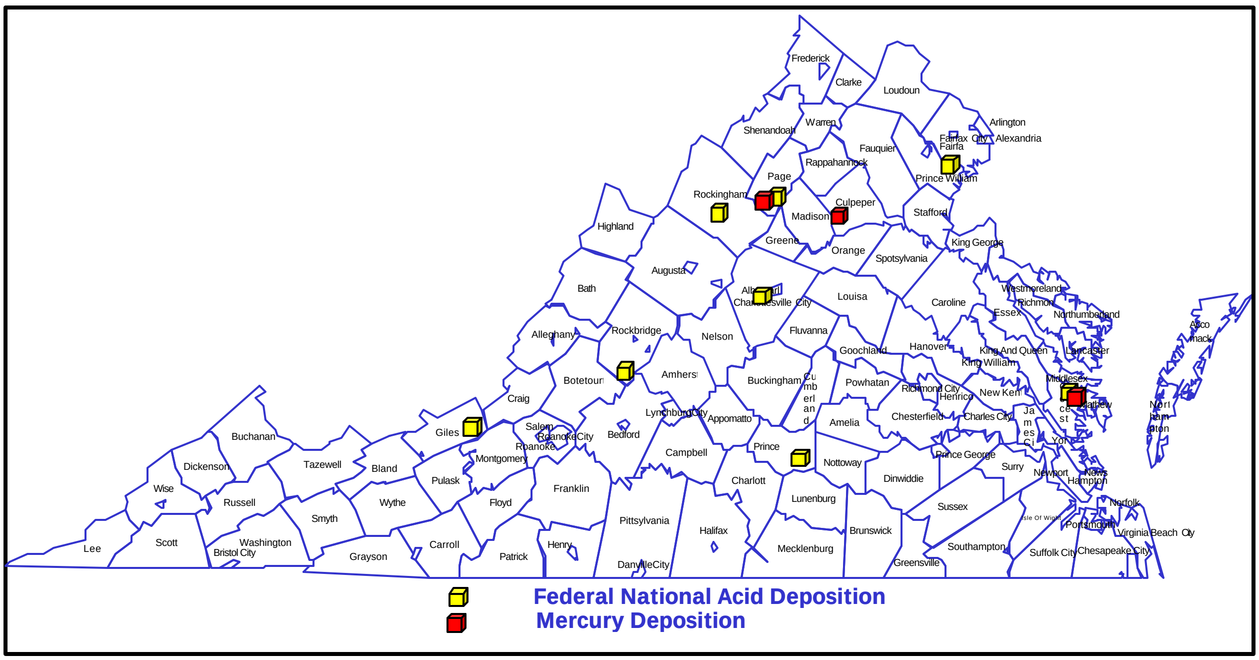
Photochemical Assessment Monitoring Stations

Air Toxics Monitoring Network

The Virginia Department of Environmental Quality sponsored three National Acid Deposition Program (NADP) sites in 2005: Harcum in Gloucester County, Natural Bridge Station in Rockbridge County, and Mason Neck in Fairfax County.

The NADP has eight monitoring sites in Virginia: Big Meadows (Shenandoah National Park), Hortons Station (Giles County), Charlottesville, Prince Edward County, Harcum (Gloucester County), Harrisonburg (Rockingham County), Natural Bridge Station (Rockbridge County), and Mason Neck (Fairfax County). NADP site information and data are available on-line at http://nadp.sws.uiuc.edu.

In addition to the eight acid deposition monitors, there are three NADP Mercury Deposition Network (MDN) sites in Virginia: Harcum (Gloucester County), Big Meadows (Shenandoah National Park), and Culpeper (Culpeper County). MDN site information and data are available on-line at http://nadp.sws.uiuc.edu/mdn.



In 2005, the Air Quality Monitoring (AQM) program of the Department of Environmental Quality operated two Photochemical Assessment Monitoring stations (PAMS) at Corbin in Caroline County, and the Mathematics and Science Center in Henrico County. Additionally, 24-hour PAMS Volatile Organic Compounds (VOC) samples were collected from two core Air Toxics Monitoring Network (ATMN) sites located on the property of the DEQ Tidewater Regional Office (TRO) in Va. Beach, and Lee District Park in Fairfax County, using a one in six day sampling schedule.

Corbin was operated all year as a PAMS Type I site, collecting 24-hour VOC samples every six days (a Type I site measures upwind background ozone precursor concentrations). In addition, episodic sampling was conducted on days forecasted to be high ozone alert days for the Washington-Baltimore area in the summer.

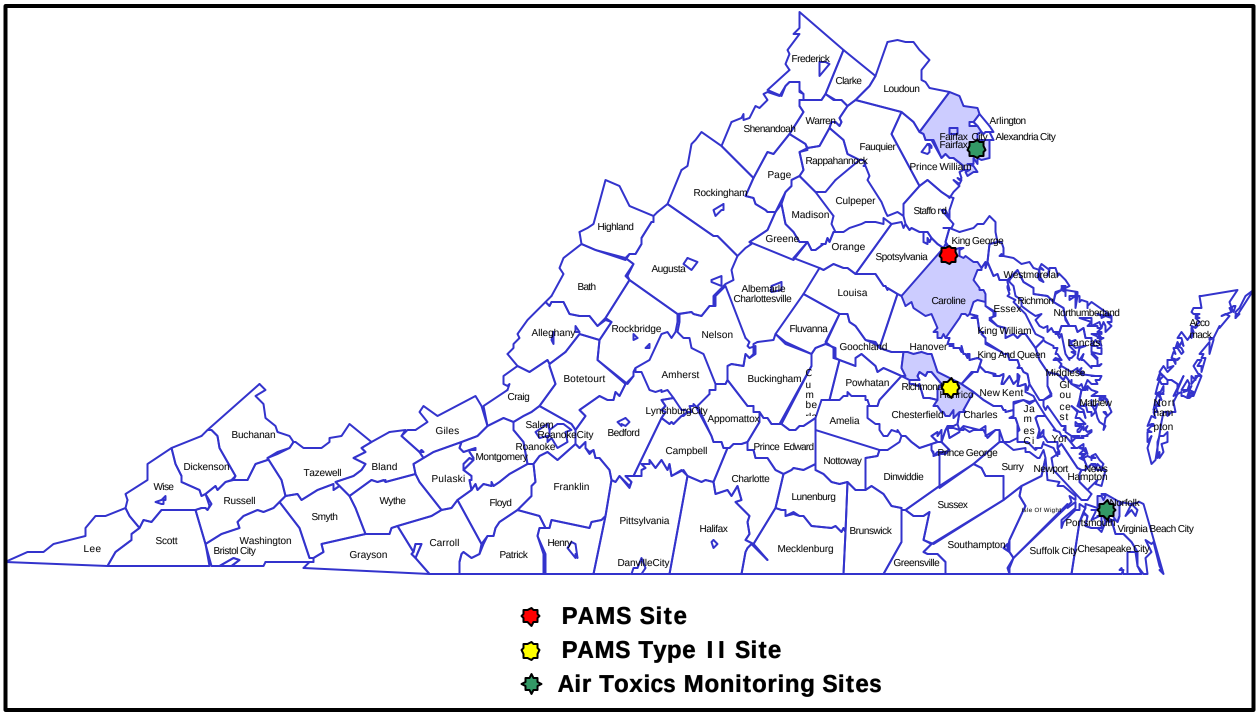
The Math and Science Center monitoring station was operated as a revised PAMS Type II site during the 2005 season, collecting one 24-hour VOC canister sample and one 24-hour Carbonyl canister sample every six days all year (a Type II site measures maximum ozone precursor concentrations in the primary downwind direction on days conducive to ozone formation). Hourly samples were collected using an Auto Gas Chromatograph.

AQM used the manual method for collecting ambient air samples. This method involves the collection of integrated, whole samples by using evacuated Summa™ canisters and RMESI (RM Environmental Systems, Inc.) air samplers. Each VOC sample from Corbin was analyzed by the Division of Consolidated Laboratory Services using a Gas Chromatograph/Flame Ionization Detector. Samples from Math and Science Center, Lee District Park, and TRO were analyzed by the Maryland Department of the Environment, Air and Radiation Management Administration, using a Gas Chromatograph/Flame Ionization Detector.

All VOC samples were analyzed for the presence of fifty-six target volatile organic precursors, and the measured concentration of Total Nonmethane Organic Compounds (TNMOC).

Detailed PAMS data are available upon written request to the Virginia Department of Environmental Quality, Office of Air Quality Monitoring.

Photochemical Assessment Monitoring Network



2005 Average Concentration of Detectable Volatile Ozone Precursors
Photochemical Assessment Monitoring Station (PAMS) Type I - Corbin, VA

Concentrations are in ppbC

Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
43141	n-dodecane	60	0.00	4.25	0.430	0.641	0.684
43202	Ethane	60	0.02	9.07	0.435	1.437	2.057
43203	Ethylene	60	0.05	8.43	0.915	1.279	1.481
43204	Propane	60	0.05	8.36	2.650	3.325	1.913
43205	Propylene	60	0.21	10.03	0.475	0.682	1.246
43206	Acetylene	60	0.10	7.33	1.280	1.586	1.295
43212	n-butane	60	0.08	7.49	1.610	2.132	1.663
43214	Isobutane	60	0.15	2.36	0.710	0.870	0.518
43216	t-2-butene	60	0.00	4.79	1.610	1.453	1.256
43217	c-2-butene	60	0.00	0.90	0.120	0.173	0.187
43220	n-pentane	60	0.14	5.81	1.205	1.410	1.139
43221	Isopentane	60	0.35	17.56	9.080	8.253	4.881
43224	1-pentene	60	0.18	3.44	0.440	0.551	0.483
43226	t-2-pentene	60	0.00	0.82	0.000	0.083	0.140
43227	c-2-pentene	60	0.00	0.97	0.500	0.468	0.235
43230	3-methylpentane	60	0.00	0.87	0.330	0.363	0.161
43231	n-hexane	60	0.09	1.44	0.665	0.707	0.328
43232	n-heptane	60	0.00	0.73	0.280	0.312	0.140
43233	n-octane	60	0.00	1.13	0.230	0.275	0.185
43235	n-nonane	60	0.00	4.73	0.230	0.346	0.619
43238	n-decane	60	0.00	7.14	0.690	0.909	1.130
43242	Cyclopentane	60	0.00	0.43	0.000	0.031	0.091
43243	Isoprene	60	0.00	41.30	0.445	6.465	10.210
43244	2,2-dimethylbutane	60	0.00	0.60	0.185	0.199	0.113
43245	1-Hexene	60	0.00	0.46	0.190	0.172	0.137
43247	2,4-dimethylpentane	60	0.00	1.78	0.255	0.353	0.331
43248	Cyclohexane	60	0.00	2.08	0.290	0.419	0.427
43249	3-methylhexane	60	0.15	2.49	1.265	1.241	0.528
43250	2,2,4-trimethylpentane	60	0.00	1.16	0.630	0.620	0.256
43252	2,3,4-trimethylpentane	60	0.00	0.73	0.270	0.266	0.161
43253	3-methylheptane	60	0.00	3.83	1.270	1.254	0.629
43261	Methylcyclohexane	60	0.00	1.44	0.385	0.373	0.239
43262	Methylcyclopentane	60	0.00	1.10	0.350	0.358	0.205
43263	2-methylhexane	60	0.00	1.59	0.695	0.677	0.327
43280	1-butene	60	0.01	1.99	0.955	0.965	0.377
43284	2,3-dimethylbutane	60	0.00	4.81	0.660	1.261	1.479
43285	2-methylpentane	60	0.00	3.38	1.030	1.156	0.634
43291	2,3-dimethylpentane	60	0.00	1.73	0.000	0.192	0.399
43954	n-undecane	60	0.00	6.31	0.475	0.595	0.851
43960	2-methylheptane	60	0.00	0.96	0.550	0.515	0.209
45109	m/p-xylene	60	0.00	1.61	0.530	0.590	0.288
45201	Benzene	60	0.00	2.48	0.970	1.015	0.538
45202	Toluene	60	0.51	4.06	1.515	1.599	0.700
45203	Ethylbenzene	60	0.00	0.94	0.280	0.305	0.162
45204	o-xylene	60	0.00	2.67	0.275	0.436	0.471
45207	1,3,5-trimethylbenzene	60	0.00	1.62	0.295	0.286	0.290
45208	1,2,4-trimethylbenzene	60	0.00	6.46	0.515	1.016	1.272
45209	n-propylbenzene	60	0.00	0.67	0.065	0.132	0.165
45210	Isopropylbenzene	60	0.00	1.04	0.000	0.105	0.206
45211	o-ethyltoluene	60	0.00	3.11	0.625	0.757	0.534
45212	m-ethyltoluene	60	0.00	3.55	0.365	0.540	0.651
45213	p-ethyltoluene	60	0.00	10.86	0.535	1.290	2.095
45218	m-diethylbenzene	60	0.00	3.26	0.435	0.554	0.520
45219	p-diethylbenzene	60	0.00	1.77	0.000	0.145	0.272
45220	Styrene	60	0.00	2.16	0.330	0.707	0.643
45225	1,2,3-trimethylbenzene	60	0.00	4.13	0.665	0.741	0.632
43000	**PAMHC**	60	20.59	139.51	48.270	53.940	20.372
43102	**TNMOC**	60	28.07	194.89	74.720	78.409	28.219

2005 Average Concentration of Detectable Volatile Ozone Precursors Photochemical Assessment Monitoring Station (PAMS) Type I - Math & Science Ctr.

Concentrations are in ppbC

Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
43141	n-dodecane	56	0.09	6.05	0.430	0.856	1.150
43202	Ethane	56	2.78	32.07	7.600	9.351	6.370
43203	Ethylene	56	0.89	10.18	2.920	3.507	2.247
43204	Propane	56	2.70	25.06	7.215	8.233	5.085
43205	Propylene	56	0.44	4.99	1.285	1.492	0.939
43206	Acetylene	56	0.68	9.02	2.170	2.679	1.799
43212	n-butane	56	1.07	24.25	3.630	6.004	5.725
43214	Isobutane	56	0.64	7.75	1.830	2.397	1.774
43216	t-2-butene	56	0.05	0.74	0.190	0.218	0.166
43217	c-2-butene	56	0.05	0.73	0.175	0.207	0.144
43220	n-pentane	56	0.56	12.33	2.950	4.066	3.102
43221	Isopentane	56	1.49	19.38	5.415	6.124	3.652
43224	1-pentene	56	0.08	1.00	0.300	0.337	0.187
43226	t-2-pentene	56	0.08	2.84	0.560	0.692	0.567
43227	c-2-pentene	56	0.10	1.78	0.310	0.423	0.349
43230	3-methylpentane	56	0.21	3.42	1.030	1.127	0.702
43231	n-hexane	56	0.27	3.80	1.140	1.228	0.765
43232	n-heptane	56	0.13	1.89	0.565	0.662	0.386
43233	n-octane	56	0.00	1.47	0.360	0.402	0.242
43235	n-nonane	56	0.07	2.35	0.380	0.518	0.413
43238	n-decane	56	0.12	2.05	0.555	0.592	0.344
43242	Cyclopentane	56	0.08	1.30	0.320	0.383	0.246
43243	Isoprene	56	0.16	13.27	2.245	3.474	3.552
43244	2,2-dimethylbutane	56	0.00	1.13	0.315	0.357	0.207
43245	1-Hexene	56	0.05	0.31	0.150	0.161	0.070
43247	2,4-dimethylpentane	56	0.00	0.91	0.260	0.297	0.206
43248	Cyclohexane	56	0.00	0.89	0.255	0.309	0.196
43249	3-methylhexane	56	0.16	2.62	1.120	1.192	0.756
43250	2,2,4-trimethylpentane	56	0.24	4.23	1.065	1.301	0.890
43252	2,3,4-trimethylpentane	56	0.09	1.65	0.470	0.521	0.363
43253	3-methylheptane	56	0.00	0.85	0.220	0.243	0.185
43261	Methylcyclohexane	56	0.00	1.37	0.485	0.520	0.300
43262	Methylcyclopentane	56	0.19	2.47	0.810	0.899	0.549
43263	2-methylhexane	56	0.18	2.02	0.565	0.685	0.418
43280	1-butene	56	0.11	2.80	0.675	0.826	0.714
43284	2,3-dimethylbutane	56	0.09	4.18	0.420	0.590	0.600
43285	2-methylpentane	56	0.36	7.16	1.705	2.360	1.642
43291	2,3-dimethylpentane	56	0.00	1.18	0.350	0.394	0.254
43954	n-undecane	56	0.07	2.80	0.505	0.584	0.425
43960	2-methylheptane	56	0.00	0.89	0.270	0.305	0.197
45109	m/p-xylene	56	0.46	7.14	2.080	2.305	1.354
45201	Benzene	56	0.72	5.18	1.735	1.942	0.980
45202	Toluene	56	1.05	15.96	3.800	4.518	2.802
45203	Ethylbenzene	56	0.19	2.51	0.850	0.838	0.474
45204	o-xylene	56	0.20	2.87	0.875	0.896	0.518
45207	1,3,5-trimethylbenzene	56	0.07	1.27	0.330	0.402	0.253
45208	1,2,4-trimethylbenzene	56	0.30	4.08	1.025	1.154	0.697
45209	n-propylbenzene	56	0.08	1.57	0.310	0.385	0.256
45210	Isopropylbenzene	56	0.00	0.44	0.080	0.132	0.135
45211	o-ethyltoluene	56	0.10	1.74	0.390	0.588	0.460
45212	m-ethyltoluene	56	0.23	3.35	1.005	1.197	0.692
45213	p-ethyltoluene	56	0.11	1.83	0.530	0.634	0.382
45218	m-diethylbenzene	56	0.06	1.07	0.210	0.289	0.208
45219	p-diethylbenzene	56	0.06	1.12	0.185	0.216	0.169
45220	Styrene	56	0.06	0.91	0.245	0.287	0.178
45225	1,2,3-trimethylbenzene	56	0.00	1.07	0.300	0.334	0.204
43000	**PAMHC**	56	28.02	230.19	75.915	82.630	43.796
43102	**TNMOC**	56	68.97	374.97	159.510	168.058	64.446

2005 Average Concentration of Detectable Volatile Ozone Precursors Photochemical Assessment Monitoring Station (PAMS) Reduced Type IIA - Lee District Park

Concentrations are in ppbC

Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
43141	n-dodecane	54	0.12	0.72	0.285	0.321	0.162
43202	Ethane	54	2.11	22.49	6.245	7.395	4.172
43203	Ethylene	54	0.62	9.28	2.290	2.841	1.858
43204	Propane	54	1.55	15.13	4.640	5.708	3.064
43205	Propylene	54	0.35	3.43	0.845	1.076	0.667
43206	Acetylene	54	0.36	8.68	1.715	2.301	1.636
43212	n-butane	54	0.59	14.24	3.120	4.184	3.238
43214	Isobutane	54	0.43	5.51	1.390	1.728	1.124
43216	t-2-butene	54	0.00	0.61	0.135	0.147	0.111
43217	c-2-butene	54	0.00	0.38	0.120	0.133	0.085
43220	n-pentane	54	0.48	5.85	1.590	1.737	0.966
43221	Isopentane	54	0.79	12.58	3.455	3.989	2.212
43224	1-pentene	54	0.15	0.47	0.230	0.249	0.077
43226	t-2-pentene	54	0.03	1.64	0.235	0.287	0.252
43227	c-2-pentene	54	0.07	1.80	0.210	0.354	0.319
43230	3-methylpentane	54	0.20	2.06	0.690	0.739	0.379
43231	n-hexane	54	0.26	2.41	0.765	0.867	0.449
43232	n-heptane	54	0.14	1.31	0.430	0.474	0.227
43233	n-octane	54	0.09	0.93	0.320	0.318	0.156
43235	n-nonane	54	0.08	0.99	0.330	0.381	0.231
43238	n-decane	54	0.08	1.34	0.435	0.463	0.275
43242	Cyclopentane	54	0.09	0.69	0.250	0.263	0.122
43243	Isoprene	54	0.06	23.99	0.400	3.352	5.668
43244	2,2-dimethylbutane	54	0.07	0.71	0.270	0.281	0.146
43245	1-Hexene	54	0.06	0.28	0.120	0.136	0.058
43247	2,4-dimethylpentane	54	0.06	0.41	0.160	0.186	0.097
43248	Cyclohexane	54	0.00	0.58	0.225	0.231	0.115
43249	3-methylhexane	54	0.11	2.07	0.650	0.787	0.504
43250	2,2,4-trimethylpentane	54	0.21	1.93	0.745	0.806	0.403
43252	2,3,4-trimethylpentane	54	0.07	0.74	0.325	0.327	0.174
43253	3-methylheptane	54	0.00	0.90	0.150	0.176	0.153
43261	Methylcyclohexane	54	0.13	0.89	0.400	0.413	0.216
43262	Methylcyclopentane	54	0.15	1.31	0.565	0.580	0.279
43263	2-methylhexane	54	0.13	1.34	0.405	0.460	0.231
43280	1-butene	54	0.12	2.57	0.380	0.571	0.533
43284	2,3-dimethylbutane	54	0.09	1.62	0.330	0.390	0.281
43285	2-methylpentane	54	0.34	3.75	1.165	1.352	0.805
43291	2,3-dimethylpentane	54	0.09	0.72	0.260	0.286	0.146
43954	n-undecane	54	0.09	1.08	0.400	0.401	0.204
43960	2-methylheptane	54	0.06	0.57	0.200	0.219	0.115
45109	m/p-xylene	54	0.45	6.95	1.810	1.910	1.191
45201	Benzene	54	0.45	4.50	1.390	1.639	0.793
45202	Toluene	54	0.82	9.02	3.015	3.272	1.697
45203	Ethylbenzene	54	0.14	2.34	0.685	0.703	0.414
45204	o-xylene	54	0.17	2.25	0.690	0.750	0.426
45207	1,3,5-trimethylbenzene	54	0.09	0.83	0.280	0.302	0.164
45208	1,2,4-trimethylbenzene	54	0.27	2.83	0.830	0.894	0.499
45209	n-propylbenzene	54	0.07	1.14	0.305	0.348	0.200
45210	Isopropylbenzene	54	0.00	0.50	0.080	0.119	0.126
45211	o-ethyltoluene	54	0.08	1.51	0.325	0.402	0.290
45212	m-ethyltoluene	54	0.24	2.09	0.790	0.793	0.409
45213	p-ethyltoluene	54	0.15	1.69	0.415	0.474	0.295
45218	m-diethylbenzene	54	0.00	1.03	0.140	0.212	0.204
45219	p-diethylbenzene	54	0.07	2.03	0.130	0.287	0.396
45220	Styrene	54	0.03	0.90	0.200	0.265	0.184
45225	1,2,3-trimethylbenzene	54	0.08	0.71	0.215	0.241	0.133
43000	**PAMHC**	54	19.53	152.79	54.835	59.519	27.524
43102	**TNMOC**	54	51.22	230.48	104.500	110.484	43.279

2005 Average Concentration of Detectable Volatile Ozone Precursors Photochemical Assessment Monitoring Station Additional VOC PAMS Sampling - Tidewater Regional Office (TRO)

Concentrations are in ppbC

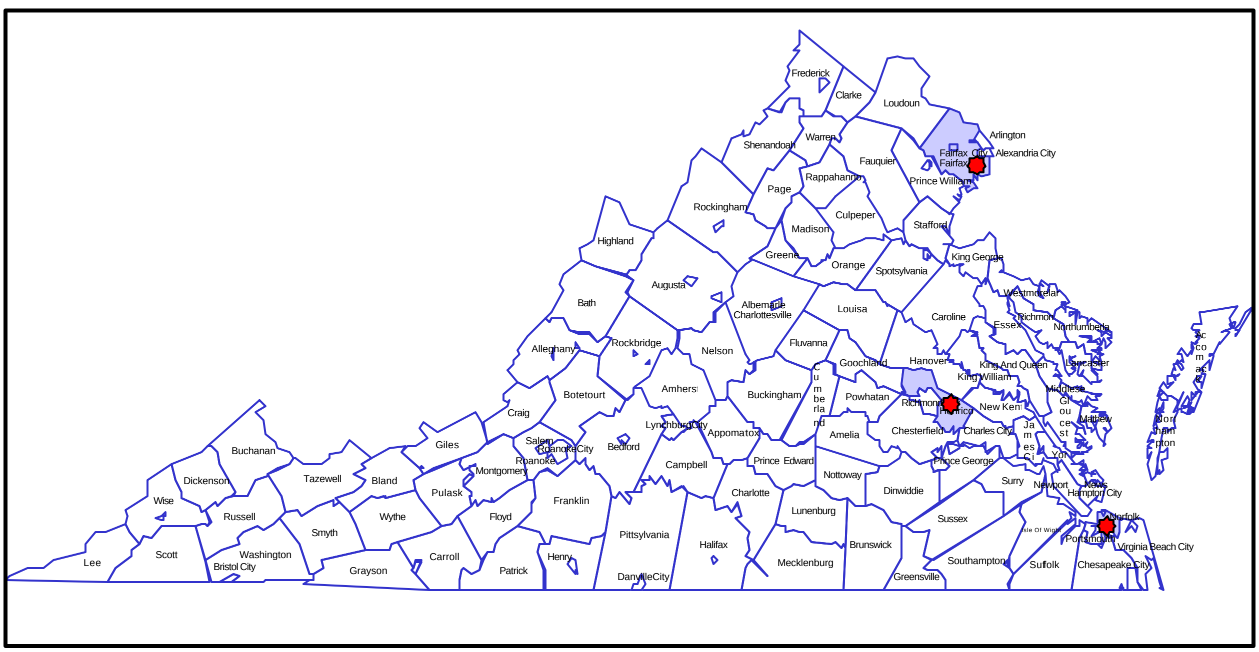
Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
43141	n-dodecane	38	0.00	1.02	0.225	0.277	0.192
43202	Ethane	38	1.64	18.77	5.220	5.806	3.552
43203	Ethylene	38	0.93	10.63	2.400	3.101	2.183
43204	Propane	38	1.52	52.61	7.445	10.371	9.730
43205	Propylene	38	0.47	4.28	0.935	1.278	0.895
43206	Acetylene	38	0.62	7.43	1.700	2.315	1.757
43212	n-butane	38	0.93	20.53	3.415	5.232	4.657
43214	Isobutane	38	0.43	10.20	1.855	2.481	2.219
43216	t-2-butene	38	0.05	1.22	0.220	0.335	0.304
43217	c-2-butene	38	0.06	0.99	0.180	0.254	0.214
43220	n-pentane	38	0.58	7.99	1.970	2.598	1.783
43221	Isopentane	38	1.25	16.63	4.625	5.544	3.616
43224	1-pentene	38	0.18	0.94	0.275	0.337	0.179
43226	t-2-pentene	38	0.16	1.50	0.510	0.586	0.360
43227	c-2-pentene	38	0.10	0.94	0.185	0.256	0.206
43230	3-methylpentane	38	0.20	3.73	0.915	1.165	0.801
43231	n-hexane	38	0.32	4.57	0.980	1.345	1.010
43232	n-heptane	38	0.21	2.39	0.570	0.735	0.522
43233	n-octane	38	0.14	2.55	0.320	0.438	0.406
43235	n-nonane	38	0.12	1.45	0.360	0.432	0.268
43238	n-decane	38	0.18	1.12	0.425	0.460	0.205
43242	Cyclopentane	38	0.13	0.86	0.255	0.315	0.198
43243	Isoprene	38	0.06	5.80	0.610	1.213	1.302
43244	2,2-dimethylbutane	38	0.06	1.08	0.285	0.346	0.209
43245	1-Hexene	38	0.07	0.33	0.140	0.149	0.063
43247	2,4-dimethylpentane	38	0.08	0.88	0.255	0.296	0.187
43248	Cyclohexane	38	0.13	1.23	0.250	0.332	0.244
43249	3-methylhexane	38	0.34	2.77	1.210	1.229	0.640
43250	2,2,4-trimethylpentane	38	0.14	3.03	0.970	1.118	0.666
43252	2,3,4-trimethylpentane	38	0.00	1.19	0.340	0.430	0.266
43253	3-methylheptane	38	0.00	0.80	0.220	0.275	0.209
43261	Methylcyclohexane	38	0.14	1.30	0.455	0.542	0.304
43262	Methylcyclopentane	38	0.15	2.65	0.775	0.893	0.561
43263	2-methylhexane	38	0.11	2.34	0.490	0.647	0.490
43280	1-butene	38	0.12	3.28	0.510	0.752	0.800
43284	2,3-dimethylbutane	38	0.08	1.75	0.435	0.528	0.349
43285	2-methylpentane	38	0.31	6.51	2.150	2.300	1.365
43291	2,3-dimethylpentane	38	0.00	1.23	0.340	0.407	0.275
43954	n-undecane	38	0.10	0.83	0.335	0.366	0.184
43960	2-methylheptane	38	0.00	0.89	0.270	0.308	0.201
45109	m/p-xylene	38	0.46	6.91	2.120	2.581	1.629
45201	Benzene	38	0.61	5.13	1.320	1.778	1.152
45202	Toluene	38	0.65	11.81	3.530	4.461	2.885
45203	Ethylbenzene	38	0.14	2.61	0.850	0.959	0.578
45204	o-xylene	38	0.17	2.71	0.780	0.965	0.613
45207	1,3,5-trimethylbenzene	38	0.00	1.45	0.305	0.404	0.331
45208	1,2,4-trimethylbenzene	38	0.38	3.43	0.920	1.196	0.773
45209	n-propylbenzene	38	0.00	1.64	0.325	0.394	0.283
45210	Isopropylbenzene	38	0.00	0.55	0.080	0.140	0.147
45211	o-ethyltoluene	38	0.07	1.24	0.340	0.425	0.282
45212	m-ethyltoluene	38	0.20	3.29	0.910	1.088	0.685
45213	p-ethyltoluene	38	0.17	2.54	0.460	0.601	0.473
45218	m-diethylbenzene	38	0.00	1.12	0.220	0.228	0.193
45219	p-diethylbenzene	38	0.08	0.99	0.135	0.176	0.151
45220	Styrene	38	0.12	1.31	0.260	0.305	0.208
45225	1,2,3-trimethylbenzene	38	0.06	0.79	0.220	0.297	0.188
43000	**PAMHC**	38	26.69	200.95	60.600	73.792	43.129
43102	**TNMOC**	38	65.93	296.02	104.105	123.729	58.572

In 2005, the Air Quality Monitoring (AQM) program of the Department of Environmental Quality operated three Air Toxics Monitoring Network (ATMN) stations. These sites are located at the Math and Science Center in Henrico County, DEQ Tidewater Regional Office (TRO) in Va. Beach, and Lee District Park in Fairfax County. Sampling at these sites consisted of VOC, Carbonyl, and Total Suspended Particulate (TSP) collection. Please note that the TRO site replaces the NOAA property site in the City of Norfolk. The site was moved in January of 2005. Site and instrument issues delayed placing the TRO site into immediate operation. Sampling frequency consisted of 24-hour samples collected every 6th day. Data from these sites will be used to characterize air toxics concentrations in the respective urban areas.

AQM used the manual method for collecting ambient air samples for VOC analysis. Whole air samples were collected using evacuated Summa^{T} or Silco^{T} canisters and RMESI (RM Environmental Systems, Inc.) air samplers. Each sample was analyzed by the Maryland Department of the Environment, Air and Radiation Management Administration, using a Gas Chromatograph equipped with a Mass Selective Detector.

Carbonyls were collected on DNPH (2,4-Dinitrophenylhydrazine) treated sorbent tubes using ATEC cartridge samplers. Analyses were performed by the Philadelphia Health Department using a Liquid Chromatographic procedure.

Detailed data collected at these sites in 2005 are available upon written request to the Virginia Department of Environmental Quality, Office of Air Quality Monitoring.



Detectable VOC in 24-Hour Canister Samples
GC/MSD - Math & Science Center - Henrico County, VA
January 1 to December 31, 2005 - Concentrations are in ppbV

Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
43207	Freon 113	57	0.07	0.1	0.07	0.076	0.008
43208	Freon 114	57	0.01	0.02	0.02	0.016	0.005
43218	1,3-Butadiene	57	0	0.28	0.05	0.066	0.061
43704	Acrylonitrile	57	0.31	4.39	1.31	1.650	1.084
43801	Chloromethane	57	0.4	0.6	0.49	0.491	0.041
43802	Dichloromethane	57	0	0.21	0.07	0.069	0.044
43803	Chloroform	57	0.01	0.12	0.02	0.020	0.015
43804	Carbon Tetrachloride	57	0.05	0.09	0.07	0.070	0.009
43811	Trichlorofluoromethane	57	0.21	0.55	0.23	0.244	0.055
43812	Chloroethane	57	0	0.04	0	0.006	0.007
43813	1,1-Dichloroethane	57	0	0.01	0	0.000	0.001
43814	Methyl chloroform	57	0.01	0.03	0.02	0.019	0.004
43815	Ethylene dichloride	57	0	0.02	0.01	0.007	0.005
43817	Tetrachloroethylene	57	0	0.12	0.03	0.032	0.024
43818	1,1,2,2-Tetrachloroethane	57	0	0.01	0	0.000	0.001
43819	Bromomethane	57	0	0.04	0.01	0.012	0.008
43820	1,1,2-Trichloroethane	57	0	0.01	0	0.000	0.002
43823	Dichlorodifluoromethane	57	0.41	0.66	0.49	0.489	0.045
43824	Trichloroethylene	57	0	0.01	0	0.005	0.005
43826	1,1-Dichloroethylene	57	0	0.03	0	0.001	0.005
43829	1,2-Dichloropropane	57	0	0.61	0	0.018	0.082
43830	trans-1,3-Dichlopropylene	57	0	0	0	0.000	0.000
43831	cis-1,3-Dichlopropylene	57	0	0	0	0.000	0.000
43839	cis-1,2-Dichloroethene	57	0	0.01	0	0.000	0.001
43843	Ethylene Dibromide	57	0	0	0	0.000	0.000
43844	Hexachlorobutadiene	57	0	0.01	0	0.002	0.004
43860	Vinyl Chloride	57	0	0.01	0	0.000	0.001
45109	m/p-Xylene	57	0.03	0.63	0.12	0.150	0.115
45201	Benzene	57	0.06	0.7	0.2	0.236	0.141
45202	Toluene	57	0.07	1.9	0.33	0.413	0.320
45203	Ethylbenzene	57	0.01	0.22	0.05	0.057	0.041
45204	o-Xylene	57	0.01	0.24	0.05	0.058	0.043
45207	1,3,5-Trimethylbenzene	57	0	0.08	0.01	0.018	0.014
45208	1,2,4-Trimethylbenzene	57	0.01	0.29	0.06	0.068	0.053
45213	p-Ethyltoluene	57	0.01	0.09	0.02	0.025	0.018
45220	Styrene	57	0	0.08	0.02	0.024	0.017
45801	Chlorobenzene	57	0	0.02	0.01	0.006	0.005
45805	1,2-Dichlorobenzene	57	0	0.02	0	0.001	0.004
45806	1,3-Dichlorobenzene	57	0	0.04	0	0.003	0.008
45807	1,4-Dichlorobenzene	57	0	0.09	0.02	0.026	0.020
45810	1,2,4-Trichlorobenzene	57	0	0.01	0	0.004	0.005

Detectable VOC in 24-Hour Canister Samples
GC/MSD - Lee District Park - Fairfax County, VA
January 1 to December 31, 2005 - Concentrations are in ppbV

Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
43207	Freon 113	58	0.07	0.1	0.08	0.077	0.007
43208	Freon 114	58	0.01	0.03	0.02	0.017	0.005
43218	1,3-Butadiene	58	0.01	0.22	0.035	0.046	0.040
43704	Acrylonitrile	58	0	0.33	0.04	0.060	0.068
43801	Chloromethane	58	0.41	0.58	0.49	0.489	0.037
43802	Dichloromethane	58	0	0.16	0.07	0.070	0.038
43803	Chloroform	58	0.01	0.05	0.02	0.022	0.009
43804	Carbon Tetrachloride	58	0.06	0.11	0.08	0.077	0.008
43811	Trichlorofluoromethane	58	0.21	0.27	0.23	0.232	0.013
43812	Chloroethane	58	0	0.03	0.01	0.007	0.007
43813	1,1-Dichloroethane	58	0	0.02	0	0.001	0.003
43814	Methyl chloroform	58	0.01	0.04	0.02	0.021	0.005
43815	Ethylene dichloride	58	0	0.02	0.01	0.008	0.005
43817	Tetrachloroethylene	58	0.01	0.15	0.04	0.041	0.028
43818	1,1,2,2-Tetrachloroethane	58	0	0.01	0	0.001	0.003
43819	Bromomethane	58	0	0.03	0.01	0.011	0.007
43820	1,1,2-Trichloroethane	58	0	0.01	0	0.001	0.003
43823	Dichlorodifluoromethane	58	0.39	0.65	0.5	0.492	0.041
43824	Trichloroethylene	58	0	0.07	0.01	0.013	0.016
43826	1,1-Dichloroethylene	58	0	0.01	0	0.001	0.003
43829	1,2-Dichloropropane	58	0	0.02	0	0.002	0.004
43830	trans-1,3-Dichlopropylene	58	0	0.01	0	0.001	0.003
43831	cis-1,3-Dichlopropylene	58	0	0.01	0	0.001	0.003
43839	cis-1,2-Dichloroethene	58	0	0.01	0	0.001	0.003
43843	Ethylene Dibromide	58	0	0.01	0	0.001	0.003
43844	Hexachlorobutadiene	58	0	0.04	0	0.003	0.007
43860	Vinyl Chloride	58	0	0.01	0	0.001	0.003
45109	m/p-Xylene	58	0.02	0.63	0.09	0.118	0.099
45201	Benzene	58	0.05	0.57	0.16	0.207	0.119
45202	Toluene	58	0.06	0.85	0.24	0.288	0.179
45203	Ethylbenzene	58	0.01	0.2	0.04	0.047	0.036
45204	o-Xylene	58	0.01	0.2	0.04	0.046	0.033
45207	1,3,5-Trimethylbenzene	58	0	0.05	0.01	0.014	0.010
45208	1,2,4-Trimethylbenzene	58	0.01	0.21	0.04	0.052	0.038
45213	p-Ethyltoluene	58	0	0.09	0.01	0.021	0.020
45220	Styrene	58	0	0.05	0.01	0.018	0.011
45801	Chlorobenzene	58	0	0.02	0	0.002	0.005
45805	1,2-Dichlorobenzene	58	0	0.02	0	0.002	0.004
45806	1,3-Dichlorobenzene	58	0	0.01	0	0.001	0.003
45807	1,4-Dichlorobenzene	58	0	0.04	0.01	0.015	0.008
45810	1,2,4-Trichlorobenzene	58	0	0.03	0	0.004	0.006

Detectable VOC in 24-Hour Canister Samples
GC / MSD - Tidewater Regional Office (TRO) – Va. Beach, VA
January 1 to December 31, 2005 – Concentrations are in ppbV

Parameter	Compound Name	Num	Minimum	Maximum	Median	Mean	StDev
43207	Freon 113	45	0.07	0.08	0.08	0.076	0.005
43208	Freon 114	45	0.01	0.02	0.02	0.015	0.005
43218	1,3-Butadiene	45	0	0.19	0.05	0.056	0.040
43704	Acrylonitrile	45	0.01	0.45	0.08	0.132	0.120
43801	Chloromethane	45	0.43	0.63	0.5	0.501	0.044
43802	Dichloromethane	45	0.01	0.17	0.08	0.075	0.040
43803	Chloroform	45	0.01	0.06	0.02	0.023	0.012
43804	Carbon Tetrachloride	45	0.06	0.08	0.07	0.074	0.006
43811	Trichlorofluoromethane	45	0.21	0.24	0.23	0.229	0.008
43812	Chloroethane	45	0	0.01	0	0.002	0.004
43813	1,1-Dichloroethane	45	0	0.01	0	0.000	0.002
43814	Methyl chloroform	45	0.01	0.02	0.02	0.018	0.004
43815	Ethylene dichloride	45	0	0.01	0.01	0.009	0.003
43817	Tetrachloroethylene	45	0.01	4.48	0.2	0.648	1.130
43818	1,1,2,2-Tetrachloroethane	45	0	0.01	0	0.000	0.002
43819	Bromomethane	45	0	0.03	0.01	0.012	0.007
43820	1,1,2-Trichloroethane	45	0	0.01	0	0.000	0.002
43823	Dichlorodifluoromethane	45	0.41	0.55	0.5	0.499	0.026
43824	Trichloroethylene	45	0	0.03	0	0.005	0.007
43826	1,1-Dichloroethylene	45	0	0.01	0	0.002	0.004
43829	1,2-Dichloropropane	45	0	0.01	0	0.000	0.002
43830	trans-1,3-Dichlopropylene	45	0	0.01	0	0.000	0.001
43831	cis-1,3-Dichlopropylene	45	0	0.01	0	0.000	0.002
43839	cis-1,2-Dichloroethene	45	0	0.01	0	0.000	0.001
43843	Ethylene Dibromide	45	0	0.01	0	0.000	0.002
43844	Hexachlorobutadiene	45	0	0.01	0	0.002	0.004
43860	Vinyl Chloride	45	0	0.02	0	0.001	0.004
45109	m/p-Xylene	45	0.02	0.73	0.11	0.188	0.164
45201	Benzene	45	0.07	0.76	0.17	0.224	0.150
45202	Toluene	45	0.04	1.55	0.3	0.457	0.340
45203	Ethylbenzene	45	0.01	0.26	0.05	0.068	0.056
45204	o-Xylene	45	0.01	0.24	0.04	0.065	0.053
45207	1,3,5-Trimethylbenzene	45	0	0.09	0.01	0.020	0.020
45208	1,2,4-Trimethylbenzene	45	0.01	0.32	0.05	0.079	0.072
45213	p-Ethyltoluene	45	0	0.12	0.02	0.028	0.027
45220	Styrene	45	0	0.15	0.02	0.025	0.026
45801	Chlorobenzene	45	0	0.01	0	0.001	0.003
45805	1,2-Dichlorobenzene	45	0	0.01	0	0.001	0.003
45806	1,3-Dichlorobenzene	45	0	0.01	0	0.001	0.003
45807	1,4-Dichlorobenzene	45	0	0.04	0.01	0.015	0.009
45810	1,2,4-Trichlorobenzene	45	0	0.01	0	0.005	0.005

24 Hour Carbonyl Sampling 2005 Summary Statistical Analysis

Concentrations are in ppbV

Site	Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
Lee Park	43502	Formaldehyde	59	0.067	7.002	2.515	2.851	1.617
	43503	Acetaldehyde	59	0.250	1.846	1.021	1.077	0.352
	43504	Propionaldehyde	59	0.000	0.407	0.238	0.244	0.075
	43505	Acrolein	59	0.000	0.192	0.052	0.056	0.036
	43551	Acetone	59	0.128	2.865	1.469	1.412	0.649
	43552	Methyl Ethyl Ketone	59	0.042	0.657	0.237	0.257	0.105
	43560	Methyl Isobutyl Ketone	59	0.000	0.037	0.000	0.005	0.009

Site	Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
Math & Science Center	43502	Formaldehyde	54	0.035	9.845	2.288	2.836	1.926
	43503	Acetaldehyde	54	0.131	2.371	1.078	1.082	0.408
	43504	Propionaldehyde	54	0.085	0.515	0.277	0.274	0.093
	43505	Acrolein	54	0.000	0.212	0.073	0.075	0.041
	43551	Acetone	54	0.201	4.308	1.481	1.582	0.880
	43552	Methyl Ethyl Ketone	54	0.019	0.597	0.261	0.269	0.123
	43560	Methyl Isobutyl Ketone	54	0.000	0.108	0.000	0.009	0.019

Site	Parameter	Compound Name	Num	Minimum	Maximum	Median	Average	StDev
Tiedwater Regional Office	43502	Formaldehyde	30	0.926	6.882	2.226	2.677	1.374
	43503	Acetaldehyde	30	0.183	1.574	0.627	0.734	0.384
	43504	Proipionaldehyde	30	0.052	0.294	0.141	0.156	0.069
	43505	Acrolein	30	0.010	0.141	0.030	0.042	0.032
	43551	Acetone	30	0.081	1.801	0.317	0.698	0.650
	43552	Methyl Ethyl Ketone	30	0.034	0.366	0.126	0.165	0.101
	43560	Methyl Isobutyl Ketone	30	0.000	0.072	0.011	0.013	0.016

AQI (Air Quality Index)

What is the AQI?

The air quality index (AQI) is a measurement designed to indicate how clean or polluted the air is in an area, and it also provides information about health effects associated with air pollution. The index is reported daily, or in some cases continuously, and calculated from measured concentrations of five major pollutants regulated by the Clean Air Act: ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. EPA has established national ambient air quality standards (NAAQS) for each of these pollutants to protect public health, and the index is derived from the NAAQS. State and local agencies are required to report the AQI in areas where the population is 350,000 or more, although it is often reported in additional areas as a public service.

How does the AQI work?

The AQI range is from 0 to 500, with the low numbers representing good air quality and the high numbers indicating unhealthy, or even hazardous air quality. The index is divided into six categories with coordinating color codes. In addition, each category has a health-related message associated with it, to inform the public of possible health effects that may arise as a result of breathing polluted air.

Generally, an index of 100 corresponds to the national air quality standard for the pollutant, which is the level that EPA has established to protect public health. Levels below 100 are considered satisfactory, while numbers above 100 are considered unhealthy, first for sensitive groups, and then for the general public as the index value increases.

How is the AQI calculated?

The AQI is calculated from air pollution measurements collected at monitoring sites across the country. The reporting agency must calculate an index for each pollutant from the measured concentrations at all monitoring sites in an area using a standard formula developed by EPA. The pollutant with the highest index is reported as the "primary pollutant", and the highest index is reported as the AQI for the area. If the AQI is above 100, then the agency must report which groups may be sensitive to the primary pollutant. If two or more pollutants have indexes above 100, then the agency must report all groups that may be affected by those pollutants.

In Virginia, as well as most of the nation, the pollutants of greatest concern are ground-level ozone, and airborne particulate matter. Currently, the AQI is only reported for those two pollutants in Virginia.

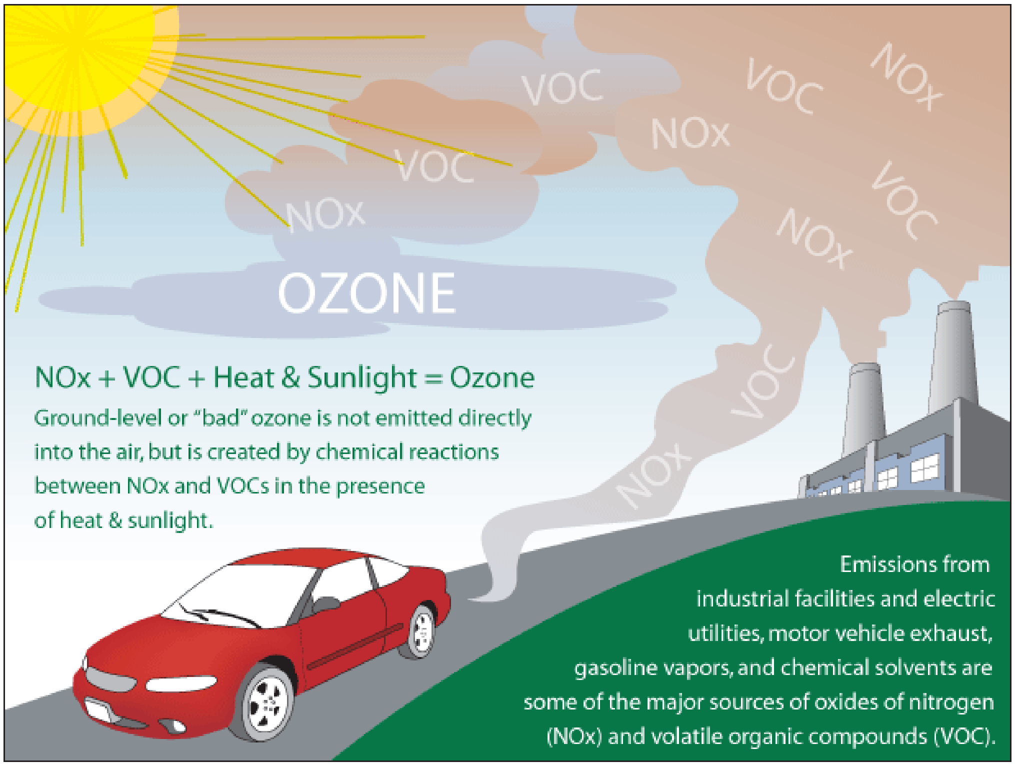
How do I find the AQI for my area?

DEQ reports the air quality index for Roanoke, Winchester, Richmond, Hampton Roads, and Northern Virginia for ozone and particulate matter on the internet at www.deq.virginia.gov/airquality . Air quality forecasts and current ozone data can be obtained at the DEQ site, as well as links to other air quality websites. EPA also reports air quality conditions for the United States at www.airnow.gov.

In addition to the internet, current and forecasted AQI levels are broadcast on local television and radio weather reports in many areas, as well as printed in newspapers. By reaching out to the public using these different media, individuals can plan their activities to reduce exposure during episodes of poor air quality, and they can also take steps to reduce pollution.

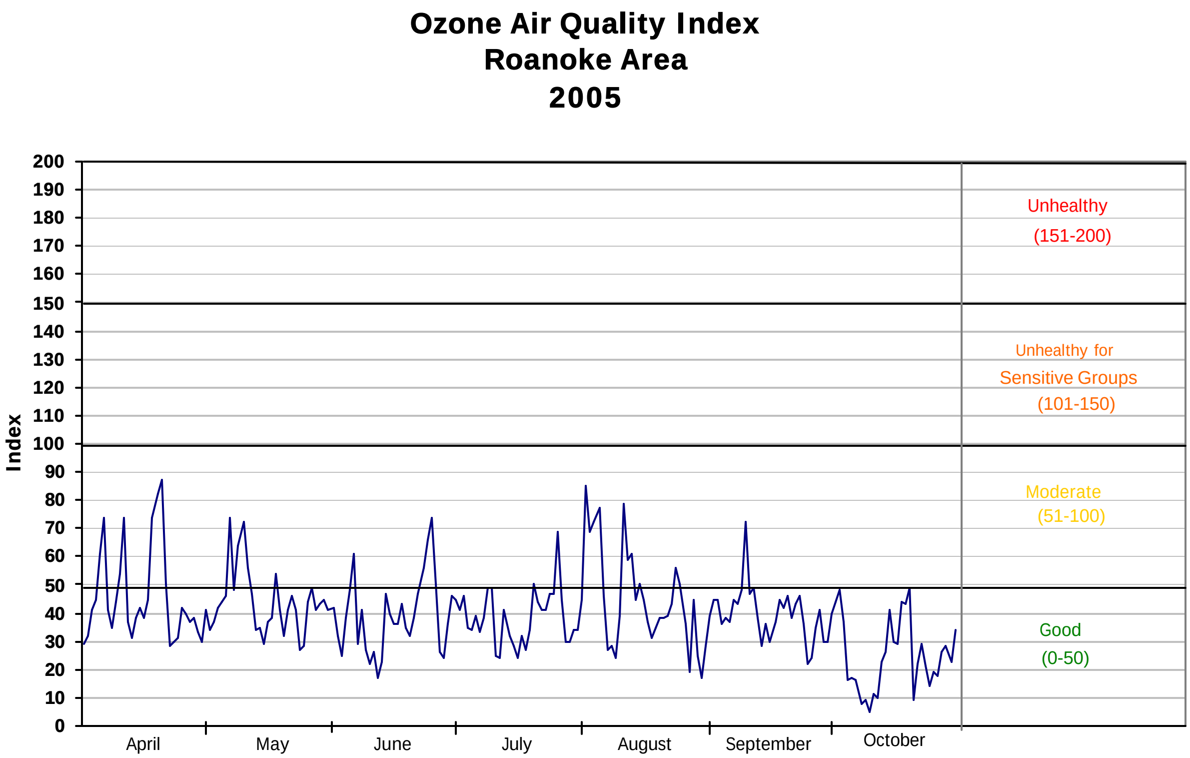
For detailed information about the AQI, and on health effects of the pollutants that are included in the AQI, visit www.airnow.gov .

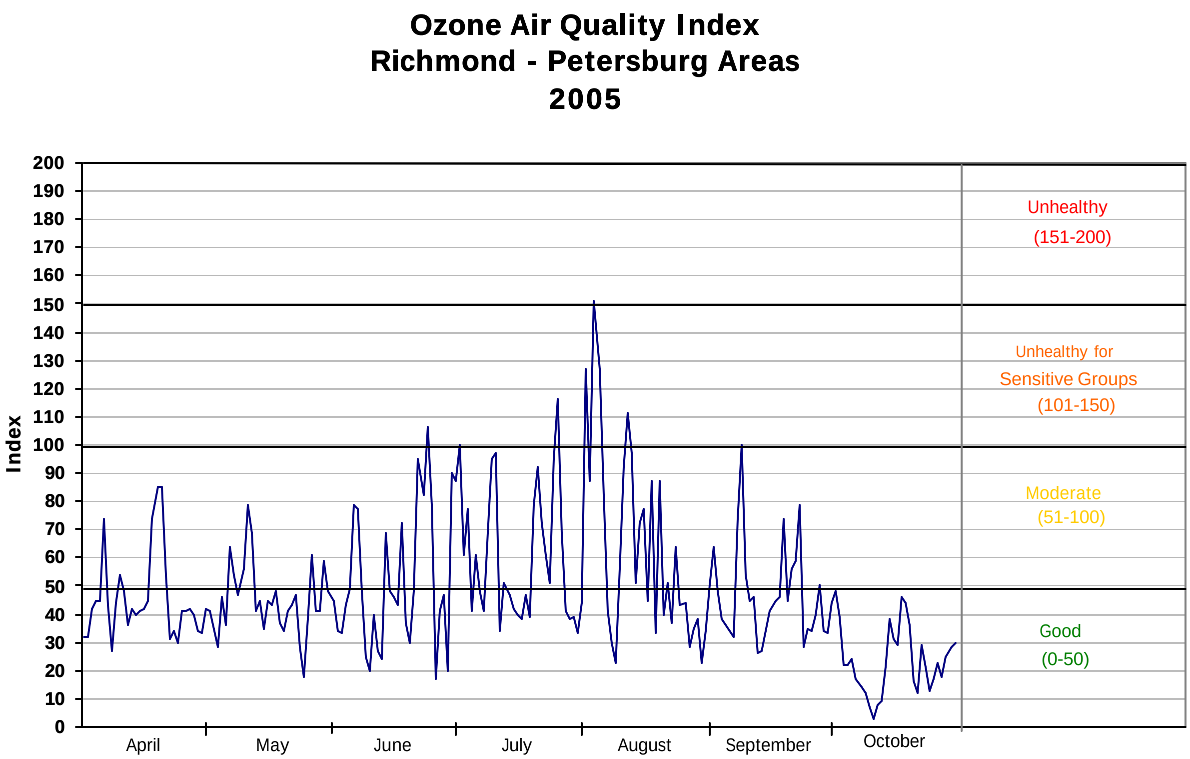
Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0-50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51-100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101-150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151-200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201-300	Health alert: everyone may experience more serious health effects.
Hazardous	> 300	Health warnings of emergency conditions. The entire population is more likely to be affected.



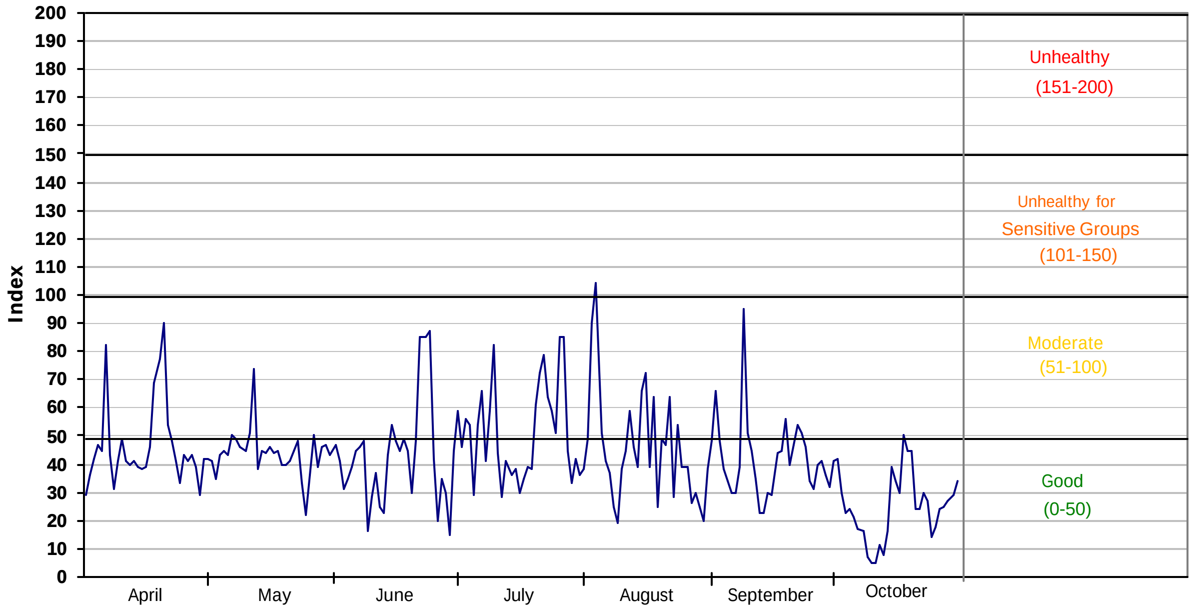
Every day tips:	**Ozone Action Day tips:**
- Conserve energy—at home, at work, everywhere. - Defer use of gasoline-powered lawn and garden equipment. Follow gasoline refueling instructions for efficient vapor recovery. Be careful not to spill fuel and always tighten your gas cap securely. - Keep car, boat, and other engines tuned up according to manufacturers' specification. - Be sure your tires are properly inflated. - Carpool, use public transportation, bike, or walk whenever possible. - Use environmentally safe paints and cleaning products whenever possible. - Some products that you use at your home or office are made with smog-forming chemicals that can evaporate into the air when you use them. Follow manufacturers' recommendations for use and properly seal cleaners, paints, and other chemicals to prevent evaporation into the air.	- Conserve electricity and set your air conditioner at a higher temperature. - Choose a cleaner commute—share a ride to work or use public transportation. Bicycle or walk to errands when possible. - Defer use of gasoline-powered lawn and garden equipment. - Refuel cars and trucks after dusk. - Combine errands and reduce trips. - Limit engine idling. - Use household, workshop, and garden chemicals in ways that keep evaporation to a minimum, or try to delay using them when poor air quality is forecast.

For more information, please visit these sites:
http://www.epa.gov/otaq/consumer/18-youdo.pdf
http://airnow.gov/index.cfm?action=jump.jump_youcando

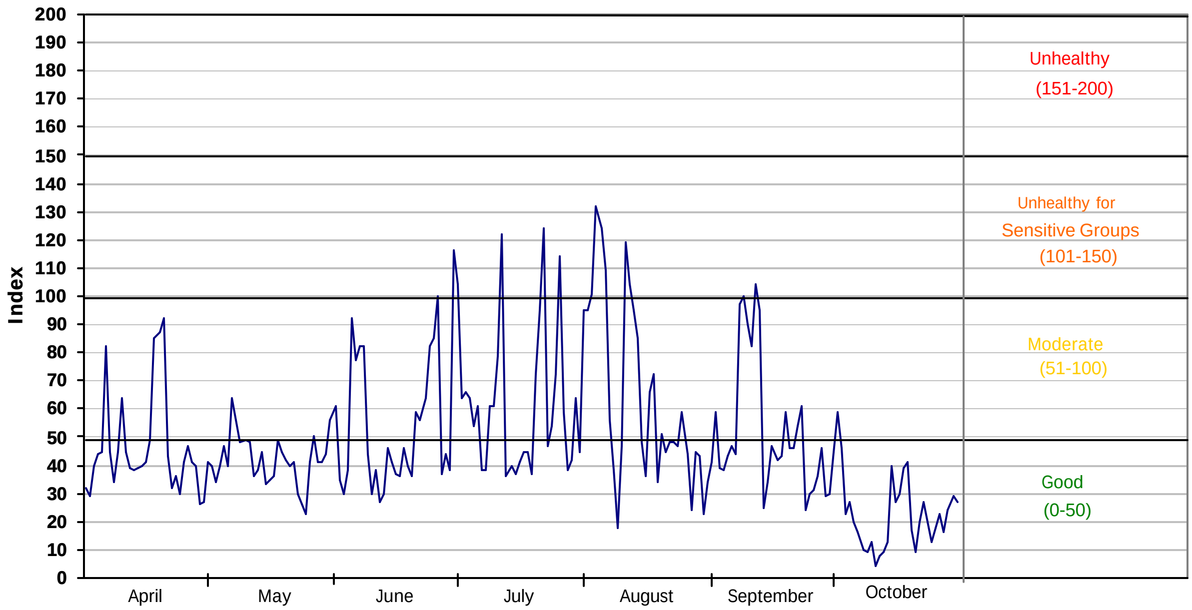

Ozone Air Quality Index
Roanoke Area
2005
Index
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
April
May
June
July
August
September
October
Unhealthy
(151-200)
Unhealthy for
Sensitive Groups
(101-150)
Moderate
(51-100)
Good
(0-50)


Ozone Air Quality Index
Richmond - Petersburg Areas
2005
Index
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
April
May
June
July
August
September
October
Unhealthy
(151-200)
Unhealthy for
Sensitive Groups
(101-150)
Moderate
(51-100)
Good
(0-50)

Ozone Air Quality Index
Norfolk - Virginia Beach - Newport News Areas
2005



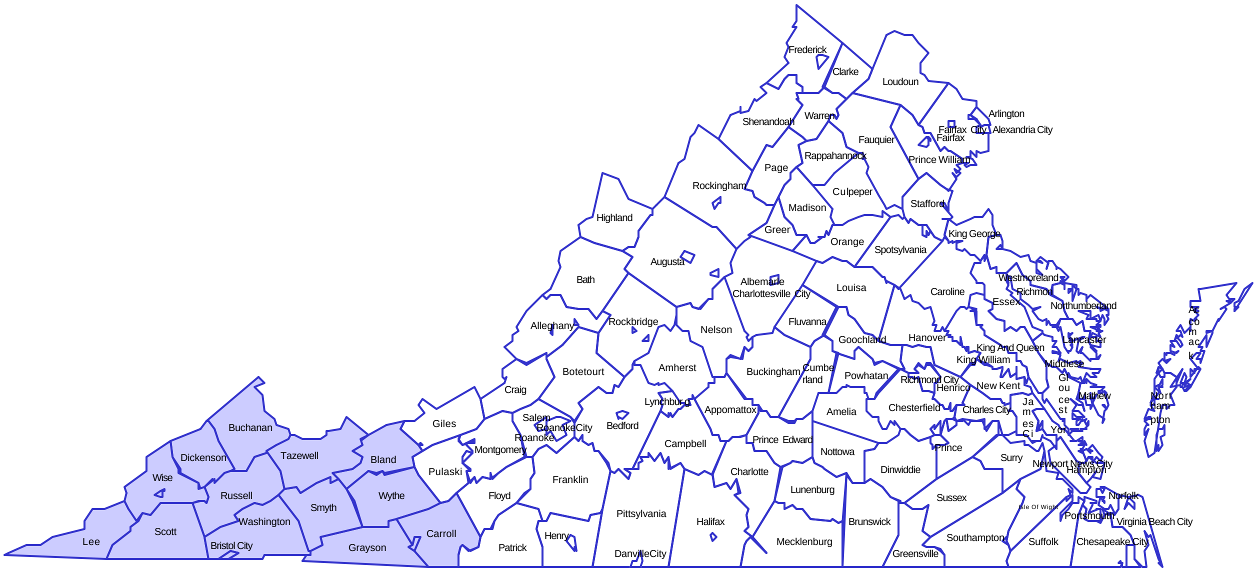
Ozone Air Quality Index
Washington, DC Area
2005



Appendix A

Abbreviation Table

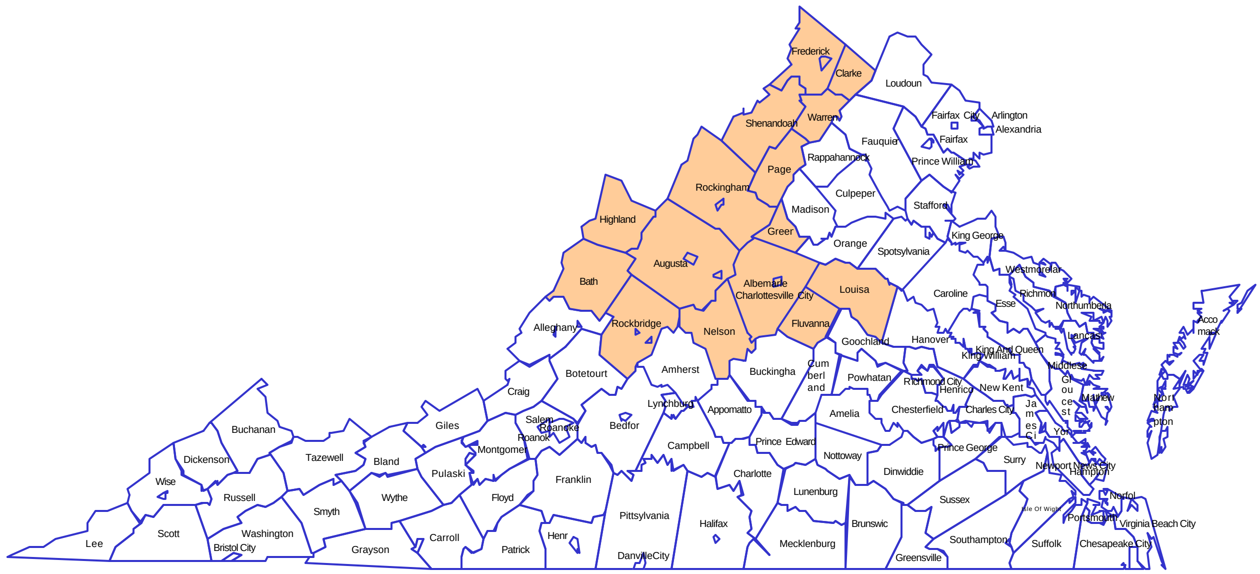
AQM	Air Quality Monitoring
AQCR	Air Quality Control Region
ATMN	Air Toxics Monitoring Network
Avg.	Average
CO	Carbon Monoxide
DEQ	Department of Environmental Quality
EAC	Early Action Compacts
EPA	Environmental Protection Agency
IMPROVE	Interagency Monitoring of Protected Visual Environments
LAT	Latitude
LONG	Longitude
MET.	Meteorological Instrumentation
MSA	Metropolitan Statistical Area
NA	Not Available
NAMS	National Air Monitoring Stations
NMOC	Non-Methane Organic Compounds
NO_2	Nitrogen Dioxide
NUM	Number of Samples
O_3	Ozone
PAMHC	Total PAMS Hydrocarbon
PAMS	Photochemical Assessment Monitoring Station
PM_{10}	Particulate Matter with an aerodynamic diameter less than or equal to 10 microns
$PM_{2.5}$	Particulate Matter with an aerodynamic diameter less than or equal to 2.5 microns
POLLUT.	Pollutant
ppbC	Part Per Billion of Carbon
ppbv	Part Per Billion of Volume
ppm	Part Per Million
SLAMS	State and Local Air Monitoring Station
SO_2	Sulfur Dioxide
STD	Standard
STDEV	Standard Deviation
TEOM	Tapered Element Oscillating Microbalance (a method for continuously measuring $PM_{2.5}$ in ambient air)
TNMOC	Total Nonmethane Organic Compound
ug/m^3	Micrograms per cubic meter
VOC	Volatile Organic Compounds



STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
16-B	O_3	Sewage Disposal Plant	51-197-0002	Rural Retreat Wythe Co.	36° 53’ 35” -81° 15’ 18”
23-A	PM_{10}	Gladeville Elementary School	51-035-0001	Galax Carroll Co.	36° 42’ 09” -80° 52’ 48”
101-E	$PM_{2.5}$, Speciation	Highland View Elementary School	51-520-0006	Bristol	36° 36’ 28” -82° 09’ 52”

Contact Information for this Region:
Southwest Regional Office
Michael D. Overstreet, Director
P.O. Box 1688
Abingdon, VA 24212
(276) 676-4800

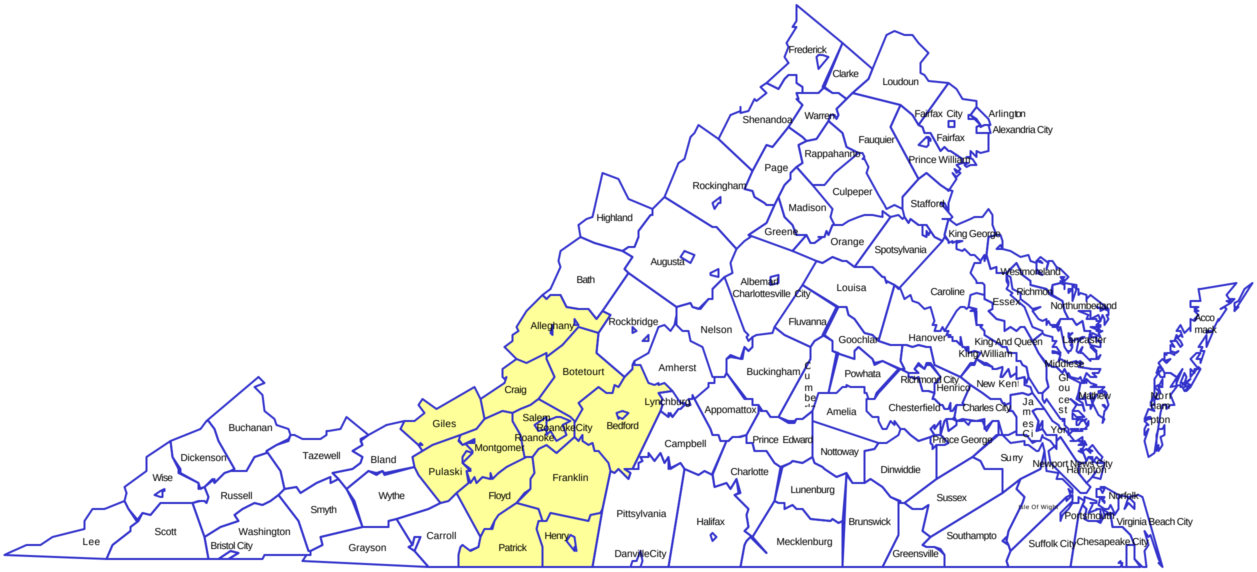
Valley Monitoring Network 2005



STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
21-C	O_3, IMPROVE	Natural Bridge Ranger Station	51-163-0003	Rockbridge Co.	37° 37' 34" -79° 30' 47"
26-F	PM_{10}, SO_2, NO_2	Rockingham VDOT	51-165-0003	Harrisonburg Rockingham Co.	38° 28' 38" -78° 49' 09"
28-J	O_3	Woodbine Road Lester Building Systems	51-069-0010	Rest Frederick Co.	39° 16' 58" -78° 04' 53"
29-D	O_3, $PM_{2.5}$	Luray Caverns Airport	51-139-0004	Luray Page Co.	38° 39' 48" -78° 30' 17"
30-E	PM_{10}	Warren Co. Memorial Hospital 1000 Shenandoah Avenue	51-187-0004	Front Royal Warren Co.	38° 55' 58" -78° 11' 54"
127-B	PM_{10}	City Hall Annex 606 E. Market Street	51/540/0002	Charlottesville	38° 01' 57" -78° 28' 37"
134-C	PM_{10}	Winchester Courts Building	51-840-0002	Winchester	39° 11' 08" -78° 09' 47"

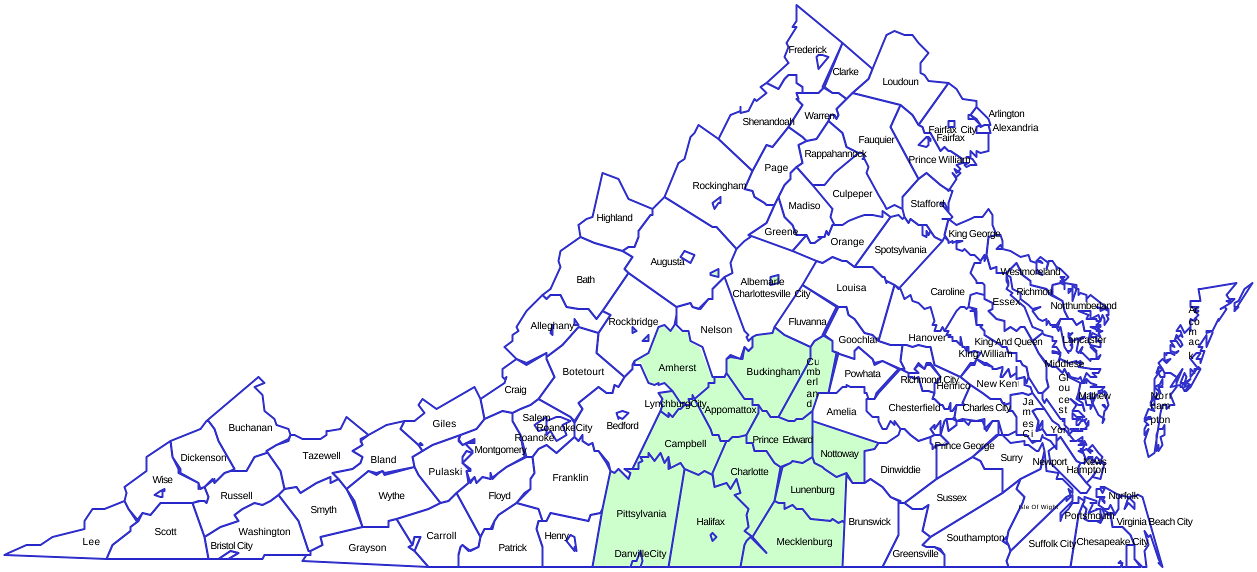
Contact information for this Region:
R. Bradley Chewning, Director
P.O. Box 3000
Harrisonburg, VA 22801
(540) 574-7800

West Central Monitoring Network 2005



STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
19-A6	SO_2, NO_2, O_3	East Vinton Elementary School Ruddell Road	51-161-1004	Vinton Roanoke Co.	37° 17' 08" -81° 15' 18"
109-H	PM_{10}	101 Cherry Hill Circle	51-770-0011	Roanoke	37° 16' 33" -79° 59' 58"
109-L	$PM_{2.5}$	Raleigh Court Library	51-770-0015	Roanoke	37° 15' 22" -79° 59' 06"
109-M	CO, TEOM	2020 Oakland Blvd.	51-770-0015	Roanoke	37° 17' 48" -79° 57' 20"
110-B	$PM_{2.5}$	Market St. Fire Station	51-775-0010	Salem	37° 17' 31" -80° 03' 25"

Contact information for this Region:
West Central Regional Office
Steven Dietrich, Director
3019 Peters Creek Road
Roanoke, VA 24019
(540) 562-6700

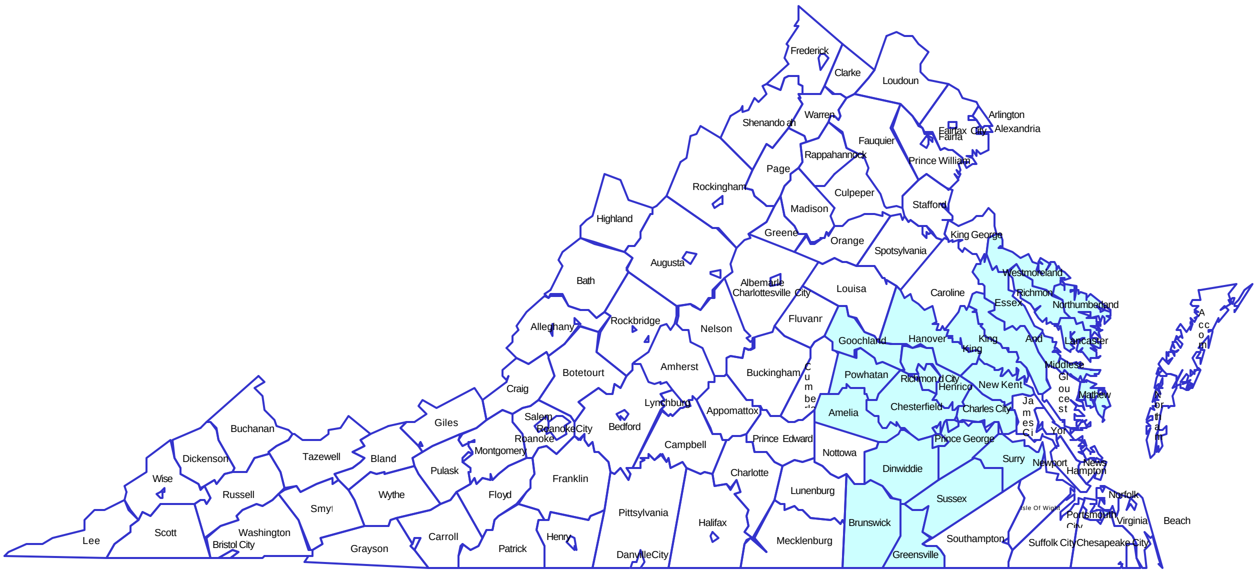


STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
155-Q	$PM_{2.5}$	Leesville Hwy. & Greystone Dr.	51-680-0015	Lynchburg	37° 33' 18" -79° 21' 45"

*maintained by West Central Regional personnel

Contact information for this Region:
South Central Regional Office
Thomas L. Henderson, Director
7705 Timberlake Road
Lynchburg, VA 24502
(434) 582-5120

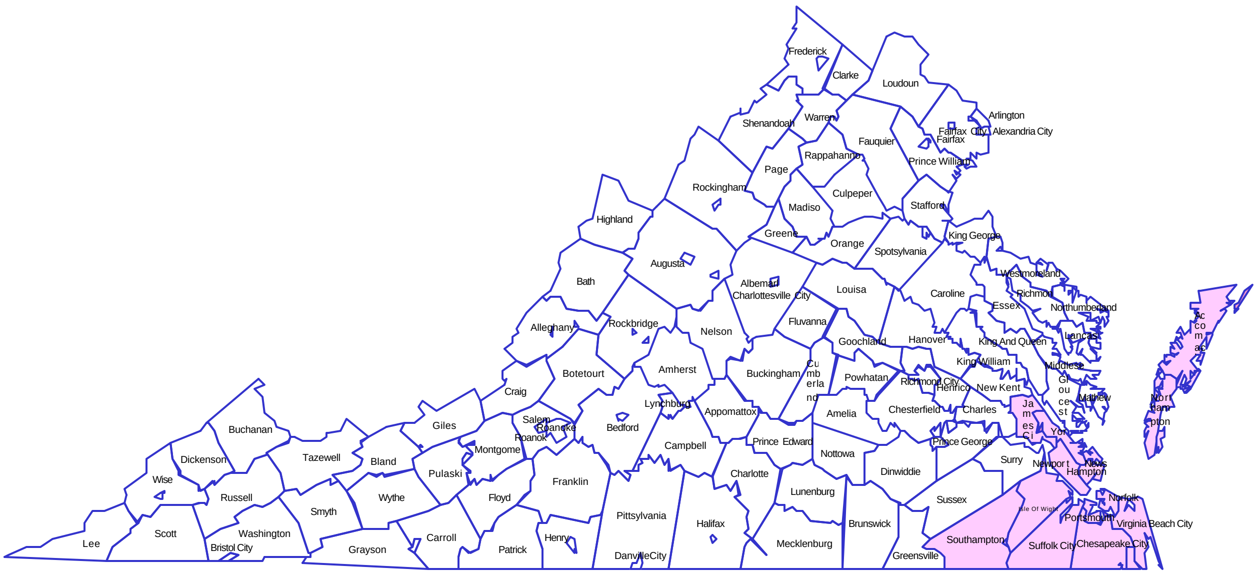
South Central Monitoring Network 2005



STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
71-D	$PM_{2.5}$	Bensley Armory	51-041-003	Chesterfield Co.	37° 26' 10" -77° 27' 03"
71-H	O_3	Beach Road Highway Shop	51-041-0004	Chesterfield Co.	37° 21' 32" -77° 35' 37"
72-M	O_3, VOC, $PM_{2.5}$, TEOM	Math and Science Center 2401 Hartman Street	51-087-0014	Henrico Co.	37° 33' 30" -77° 34' 01"
72-N	$PM_{2.5}$	DEQ-Piedmont Regional Office 4949-A Cox Road	51-087-0015	Henrico Co.	37° 40' 13" -77° 34' 03"
73-E	O_3	McClellan Road	51-085-0003	Hanover Co.	37° 36' 21" -77° 13' 07"
75-B	O_3, NO_2, SO_2, $PM_{2.5}$	Charles City County Route 608	51-036-0002	Charles City Co.	37° 20' 31" -77° 15' 39"
82-C	PM_{10}	West Point Elementary School Thompson Ave. & Chelsea Rd.	51-760-0020	West Point King William Co.	37° 33' 34" -76° 47' 43"
158-U	CO	Forest Hill Fire Station 7410 Forest Hill Avenue	51-760-0022	Richmond	37° 32' 22" -77° 27' 58"
158-W	CO, SO2, NO2	Science Museum of Virginia DMV and Leigh Street	51-760-0024	Richmond	37° 33' 45" -77° 27' 55"

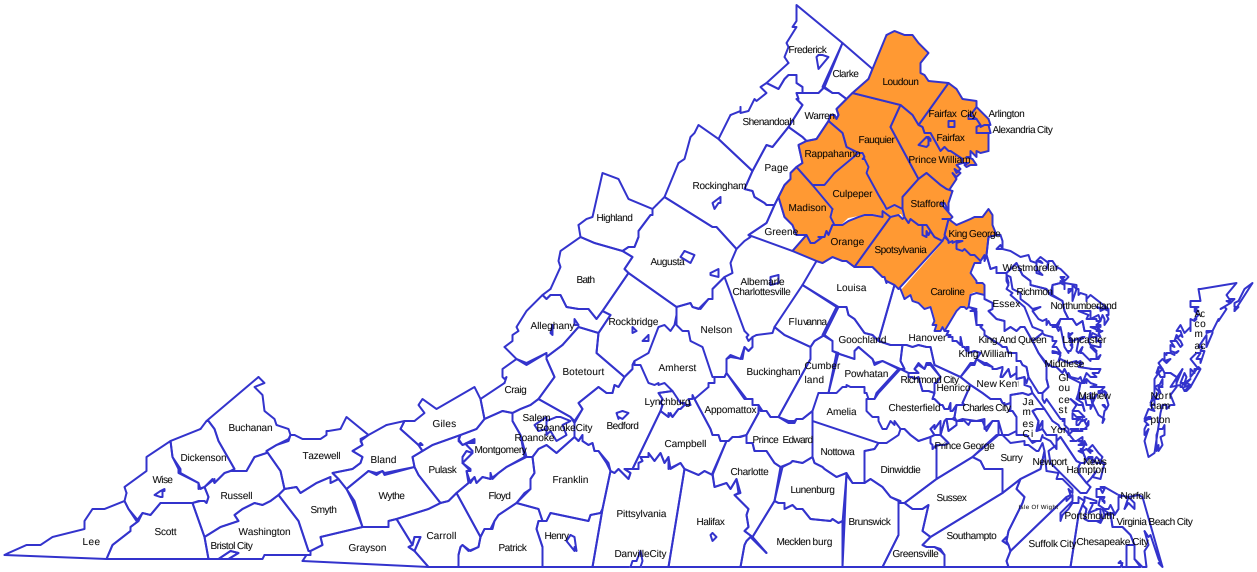
Contact Information for this Region:
Piedmont Regional Office
Gerard Seeley, Jr., Director
4949-A Cox Road
Glen Allen, VA 23060
(804) 527-5020

Tidewater Monitoring Network 2005



STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
179-C	CO, SO_2, O_3, $PM_{2.5}$, TEOM	Virginia School for the Deaf & Blind 700 Shell Road	51-650-0004	Hampton	37° 00' 12" -76° 23' 57"
181-A1	PM_{10}, $PM_{2.5}$, Toxics	NOAA Property 2nd and Woodis Avenue	51-710-0024	Norfolk	36° 51' 28" -76° 18' 06"
183-E	O_3	Tidewater Community College Frederick Campus	51-800-0004	Suffolk	36° 54' 12" -76° 43' 53"
183-F	O_3	Tidewater Research Station	51-800-0005	Suffolk	36° 40' 03" -76° 43' 53"
184-J	$PM_{2.5}$	DEQ – Tidewater Regional Office 5636 Southern Blvd.	51-810-0008	Va. Beach	36° 50' 28" -76° 10' 53"

Contact information for this Region:
Francis L. Daniel, Director
5636 Southern Blvd.
Virginia Beach, VA 23462
(757) 518-2000



STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
37-B	O_3	Phelps Wildlife Area Route 651	51-061-0002	Sumerduck Fauquier Co.	38° 28' 30" -77° 46' 04"
38-I	O_3, NO_2, $PM_{2.5}$	Broad Run High School Route 641	51-107-1005	Ashburn Loudoun Co.	39° 01' 28" -77° 29' 24"
42-B	PM_{10}	Farmington Elementary School Sunset Lane	51-047-0002	Culpeper Culpeper Co.	38° 27' 26" -78° 00' 40"
44-A	O_3	Widewater Elementary School Den Rich Road	51-179-0001	Widewater Stafford Co.	38° 28' 59" -77° 22' 13"
45-L	O_3, NO_2	Long Park Route 15	51-153-0009	Prince William Co.	38° 51' 19" -77° 38' 08"
46-B9	PAMS, O_3, CO, $PM_{2.5}$	Lee District Park Telegraph Road	51-059-0030	Franconia Fairfax Co.	38° 46' 22" -77° 06' 20"
47-T	CO, NO_2, O_3, $PM_{2.5}$	Aurora Hills Visitors Center 18th and Hayes Streets	51-013-0020	Arlington Co.	38° 51' 27" -77° 03' 33"
48-A	O_3, NO_y, VOC	U.S.G.S. Geomagnetic Center	51-033-0001	Corbin Caroline Co.	38° 51' 27" -77° 03' 33"
130-E	PM_{10}	Hugh Mercer Elementary School 2100 Cowan Boulevard	51-630-0004	Fredericksburg	38° 18' 17" -77° 29' 11"

STATION NUMBER	POLLUT.	LOCATION	EPA ID	CITY/COUNTY	LAT/LONG
L-46-A8	CO, SO_2, O_3, NO_2, $PM_{2.5}$	McLean Governmental Center 1437 Balls Hill Road	51-059-5001	McLean Fairfax Co.	38° 55' 55" -77° 11' 56"
L-46-B3	O_3, PM_{10}	Mt. Vernon Fire Station 2675 Sherwood Hall Lane	51-059-0018	Mount Vernon Fairfax Co.	38° 44' 33" -77° 04' 39"
L-46-F	CO, SO_2, O_3, NO_2, PM_{10}	Upper Cub Run Drive	51-059-0005	Chantilly Fairfax Co.	38° 53' 38" -77° 27' 55"
L-46-C1	CO, SO_2, O_3, NO_2, $PM_{2.5}$, TEOM	Mason Governmental Center 6507 Columbia Pike	51-059-1005	Annandale Fairfax Co.	38° 50' 15" -77° 09' 47"
L-126-C	CO, SO_2, O_3, NO_2	Alexandria Health Department 517 North Saint Asaph Street	51-510-0009	Alexandria	38° 48' 38" -77° 02' 40"
N-35-A	O_3, SO2, IMPROVE, TEOM	Big Meadows, National Park Service	51-113-0003	Madison Co.	38° 31' 19" -78° 26' 10"

Contact Information for this Region:
Northern Regional Office
Jeffery Steers, Director
13901 Crown Court
Woodbridge, VA 22193
(703) 583-3800

SATELLITE OFFICE:
Fredericksburg
806 Westwood Office Park
Fredericksburg, VA 22401
(540) 899-4600

Minimum Number of Observations	
3-Hour Average	3 Consecutive Hourly Observations
8-Hour	6 Hourly Observations
24-Hour	18 Hourly Observations
Quarterly Averages ($PM_{2.5}$, PM_{10})	75% of Scheduled Samples
Yearly Averages (Continuous Instruments)	75% of Total Possible Observations
Yearly Averages ($PM_{2.5}$, PM_{10})	Four Complete Quarterly Averages

National Ambient Air Quality Standards

POLLUTANT	PRIMARY STANDARD ug/m3	PRIMARY STANDARD ppm	SECONDARD STANDARD ug/m3	SECONDARD STANDARD ppm
CARBON MONOXIDE				
8-hour concentration	10,000[a]	9[a]	None	None
1-hour concentration	40,000[a]	35[a]		
SULFUR DIOXIDE				
Annual arithmetic mean	80	0.03		
24-hour concentration	365[a]	0.14[a]		
3-hour concentration			1300[a]	0.5[a]
NITROGEN DIOXIDE				
Annual arithmetic mean	100	0.053	Same as primary	
OZONE				
8-hour concentration	157[b]	0.08[b]	Same as primary	
1-hour concentration**				
LEAD				
Quarterly arithmetic mean	1.5		Same as primary	
PARTICULATE MATTER				
$PM_{2.5}$				
Annual arithmetic mean	15[c]			
24-hour concentration	65[d]			
PM_{10}			Same as primary	
Annual arithmetic mean	50			
24-hour concentration	150			

[a] Not to be exceeded more than once a year
[b] 3-year average of the 4th highest 8-hour concentration may not exceed 0.08 ppm
[c] Based on a 3-year average of annual arithmetic mean PM2.5 concentrations
[d] Based on a 3-year average of 98th percentile of 24-hour PM2.5 concentrations

*** Please see www.epa.gov/air/criteria.html for information concerning 1-hour standard for ozone.*

Number of Criteria Pollutant Monitoring Sites

NAMS/SLAMS 2005

REGION	$PM_{2.5}$	PM_{10}	CO	SO_2	NO_2	O_3	TOTAL
Southwest	1	1	---	---	---	1	3
Valley	1	4	---	1	1	3	10
West Central	2	1	1	1	1	1	7
South Central	1	---	---	---	---	---	1
Piedmont	4	1	2	2	2	4	15
Tidewater	3	3	1	1	---	3	11
***Northern**	5	4	6	4	7	12	38
TOTAL	**17**	**14**	**10**	**9**	**11**	**24**	**85**

** This region's sites are operated by DEQ, Fairfax Co., and Alexandria*
*** (This list does not include the National Park Service site)*

Areas Designated Nonattainment for the 8-Hour Ozone NAAQS

Northern Virginia
Arlington County
Fairfax County
Loudoun County
Prince William County
City of Alexandria
City of Fairfax
City of Falls Church
City of Manassas
City of Manassas Park

Fredericksburg
Spotsylvania County
Stafford County
City of Fredericksburg

Richmond
Charles City County
Chesterfield County
Hanover County
Henrico County
Prince George County
City of Colonial Heights
City of Hopewell
City of Petersburg
City of Richmond

Hampton Roads
Gloucester County
Isle of Wright
James City County
York County
City of Chesapeake
City of Hampton
City of Newport News
City of Norfolk
City of Poquoson
City of Portsmouth
City of Suffolk
City of Virginia Beach
City of Williamsburg

Shenandoah National Park
Shenandoah National Park
(the portions in Page and Madison Counties)

Areas that have been Identified as Nonattainment for the 8-hour Ozone Standard, but have received Deferment of Official Nonattainment Designation

Frederick County Early Action Area
Frederick County
City of Winchester

Roanoke Early Action Area
Botetourt County
Roanoke County
City of Roanoke
City of Salem
Town of Vinton

$PM_{2.5}$ Nonattainment Area Designations

Northern Virginia
Arlington County
Fairfax County
Loudoun County
Prince William County
City of Alexandria
City of Fairfax
City of Falls Church
City of Manassas
City of Manassas Park

Appendix B

AIRSData – Access to national and state air pollution concentrations and emissions data
http://www.epa.gov/air/data/index/html

Air Explorer – Collection of user-friendly visualization tools for air quality monitoring
http://www.epa.gov/airexplorer

Air Now – Ozone mapping, AQI, and real time data
http://www.airnow.gov

Air Now – Air Quality Index Information
http://www.airnow.gov/index.cfm?action=static.aqi

American Lung Association:
http://www.lungsusa.org

Department of Environmental Quality link:
http://www.deq.virginia.gov/

Education for teachers and children:
http://www.epa.gov/kids

MARAMA
http://www.marama.org/index.html

Nonattainment area descriptions:
http://epa.gov/oar/oaqps/greenbk

U.S. EPA:
http://www.epa.gov

2006 3-Day Monitoring Schedule for PM2.5 and 6-Day Monitoring Schedule for PM10:
http://www.epa.gov/ttn/amtic/files/ambient/pm25/cal2006.pdf

Code of Federal Regulations – 40 CFR 50 & 58

Virginia Ambient Air Monitoring Data Reports

DEQ Monthly/Quarterly Reports 1996 – 2005

Air Quality System (AQS)

Delaware Annual Air Quality Report 2003
http://www.dnrec.state.de.us/air/aqm_page/reports.htm

West Virginia 2004 Air Quality Annual Report
http://www.wv.gov/Offsite.aspx?u=http://www.wvdep.org